R E P O R T R E S U M E S

ED 014 867 EF 000 633

SPECTRUM OF ELECTRONIC TEACHING AIDS IN EDUCATION--FUNCTIONS, FACILITIES, BUDGETS.

BY- FINSTAD, ALLAN
STANFORD UNIV., CALIF., SCHOOL PLANNING LAB.
EDUCATIONAL FACILITIES LABS. INC., NEW YORK, N.Y.

PUB DATE 65

EDRS PRICE MF-$0.25 HC-$1.28 30P.

DESCRIPTORS- *AUDIO EQUIPMENT, *AUDIO VIDEO LABORATORIES, *ELECTROMECHANICAL AIDS, *ELECTRONIC EQUIPMENT, *TELEVISION, AUDIO ACTIVE LABORATORIES, EDUCATIONAL TELEVISION, ELECTRONIC CLASSROOMS, INSTRUCTIONAL MEDIA, INSTRUCTIONAL TELEVISION, LANGUAGE LABORATORIES, LANGUAGE LABORATORY EQUIPMENT, TAPE RECORDERS, TELEVISED INSTRUCTION, VIDEO TAPE RECORDINGS, EFL, SPL

THIS REPORT PRESENTS A BRIEF, NONTECHNICAL, PICTORIAL OVERVIEW OF THE EDUCATIONAL POTENTIAL AND APPROXIMATE COST TO CERTAIN CONFIGURATIONS OF ELECTRONIC AUDIO, AUDIO-VISUAL, AND TELEVISION TEACHING SYSTEMS. EQUIPMENT IS CATEGORIZED ACCORDING TO THE EXTENT TO WHICH PROGRESSIVE MODES OF LEARNING ARE SERVED, THE NATURE AND COMPLEXITY OF THE HARDWARE AND SYSTEMS, AND THE ESTIMATED BUDGET REQUIRED TO ACHIEVE A GIVEN SYSTEMS CONFIGURATION. PROGRESSIVELY MORE COMPLEX INSTALLATIONS ARE BRIEFLY DESCRIBED FOR EACH OF THE THREE SYSTEMS. SCHOOL ADMINISTRATORS AND STAFF MEMBERS CAN MORE EASILY VISUALIZE THE OVERALL SPECTRUM OF ELECTRONIC TEACHING SYSTEMS IN GRADATION OF FUNCTION AND COST THROUGH USE OF THIS BOOKLET. PICTURES, DIAGRAMS, AND ROOM LAYOUTS ARE PRESENTED FOR EACH GRADE OF SYSTEM SUGGESTED. INCLUDED IN THE ELECTRONIC DEVICES PRESENTED ARE TAPE RECORDERS, DICTATION LABORATORIES, LIBRARY LISTENING FACILITIES, LANGUAGE LABORATORIES, PROJECTION DEVICES, CLASSROOM COMMUNICATORS, MULTI-MEDIA LABORATORIES, AND TELEVISION SYSTEMS. (RH)

ED014867

SPL EFL

A Report From The School Planning Laboratory, School of Education, Stanford University

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

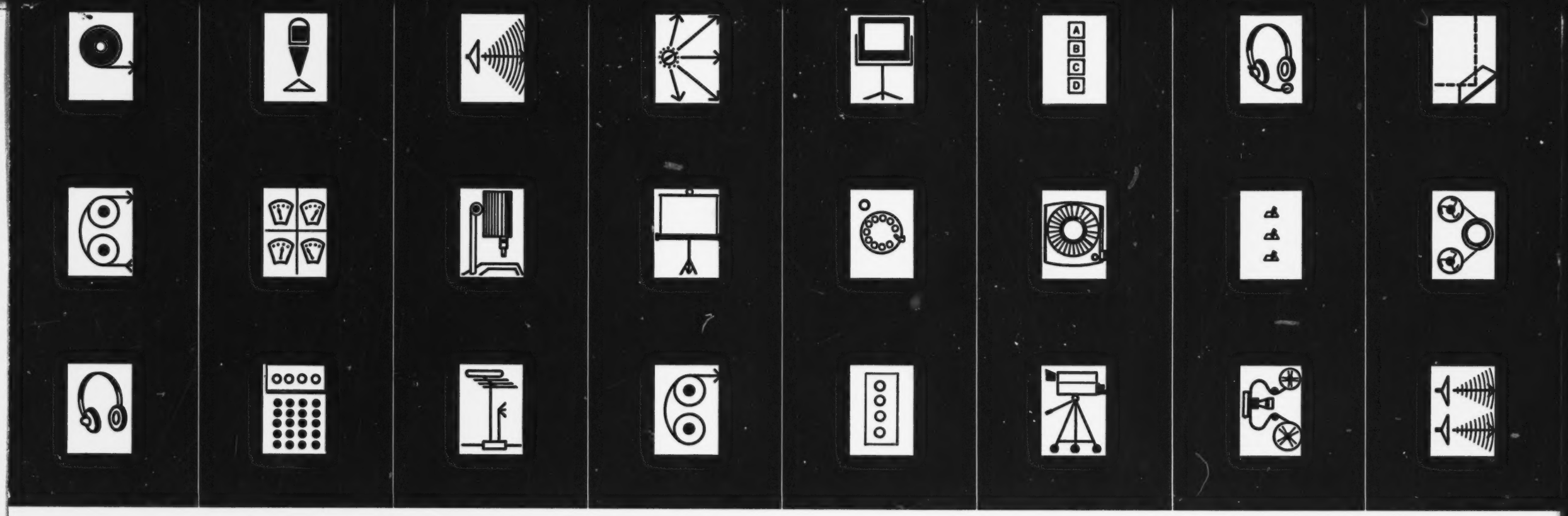
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

SPECTRUM

OF ELECTRONIC TEACHING AIDS IN EDUCATION

FUNCTIONS ■ FACILITIES ■ BUDGETS

EF 000633



SPECTRUM OF ELECTRONIC TEACHING AIDS IN EDUCATION

Report prepared by **Allan Finstad**

Designed by **Joe Seney**

PHOTOGRAPHS COURTESY OF

Advanced Educational Systems, Inc., Farmingdale, L.I., New York
Ampex Corp., Redwood City, California
Acoustron Corp., Houston, Texas
Audiotronics Corp., North Hollywood, California
A-V Electronics, Inc., Fresno, California
Chester Electronics Labs, Inc., Chester, Connecticut
Dage-Bell Corp., Michigan City, Indiana
Eastman Kodak Co., Rochester, New York
Edex Teaching Systems, Mountain View, California
Foothill Jr. College, Los Altos Hills, California
Fremont Union High School, Sunnyvale, California
General Precision Labs., Pleasantville, New York
Mardix, Mountain View, California
Newcomb Audio Products, Hollywood, California
Packard Bell, Newbury Park, California
Radio Corporation Of America, Camden, New Jersey
Reflection Educational Systems, Mountain View, California
Rheem Califone Corp., Los Angeles, California
Sigma Educational Products, Inc., New York City
The Solocast Co., Stamford, Connecticut
Viewlex, Inc., Holbrook, Long Island, New York
V-M Corp., Benton Harbor, Michigan

Educational Facilities Laboratories, Inc. is a nonprofit corporation established by the Ford Foundation in 1958 to help American schools and colleges with their physical problems by the encouragement of research and experimentation and the dissemination of knowledge regarding educational facilities. The School Planning Laboratory serves as Educational Facilities Laboratories' Western Regional Center and assists in activities related to the Western states.

Educational Facilities Laboratories Officers

Harold B. Gores, *President*
Jonathan King, *Secretary and Treasurer*

School Planning Laboratory Staff

James D. MacConnell, *Director*
John R. Boice, *Associate Director*
Don Davis, *Associate Director*
Robert G. Lamp, *Research Associate*
Robert H. Bergquist, *Editorial Associate*

Educational Facilities Laboratories, 477 Madison Avenue, New York, New York 10022
School Planning Laboratory, School of Education, Stanford University, Stanford, California 94305

1965

INTRODUCTION

The purpose of this report is to present a brief, nontechnical pictorial overview of the educational potential and approximate cost of certain configurations of electronic audio, audio-visual, and television teaching systems.

Information recorded in the form of print, phonograph records, audio tape, transparent slides, film strips, motion picture film, video discs, and video tape exists as an imposing bank of instructional resource material. This resource material is bound for storage in school libraries, instructional materials centers, instructional resource centers, or whatever the latest appellation may be. The basic justification for the existence of school libraries and the ever more spacious centers planned to house the accumulating learning resources is and ever shall be the value such resources have for instructional use and student research.

Telephone intercommunication and paging systems have long been employed in schools to perform an administrative messenger service. Manual messenger service is no longer economical or adequate for transmitting impacted knowledge, in simultaneous and multiple segments, throughout the teaching and learning areas of a school system.

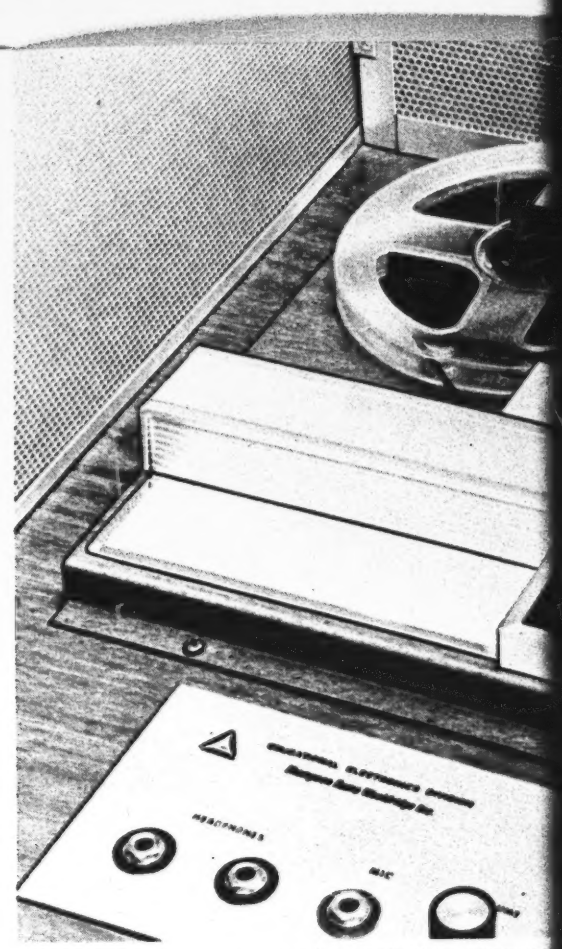
It is said that the hope and challenge of American civilization is education with literacy. The mass of educational resources embracing new and existing knowledge, skills, and attitudes is escalating. The technical climate encourages and educational requirements necessitate the design and development of convenient to use educational communication systems. The promise of electronic transmission systems arises from the speed with which they can conduct learning resources from repositories to teaching and learning spaces for convenient utilization by instructors and students.

The current advertised array of proposed and vended audio-visual programs, objects, articles, machines, and specialized systems presents a confusing picture at best. Understandably, the array is perceived as a jumble of technology scrambled with philosophical semantics by the busy school administrator. This booklet attempts to impose some order on this jumble by categorizing equipment according to: (a) the extent to which progressive modes of learning are served, (b) the nature and complexity of the hardware and systems, and (c) the estimated budget required to achieve a given systems configuration.

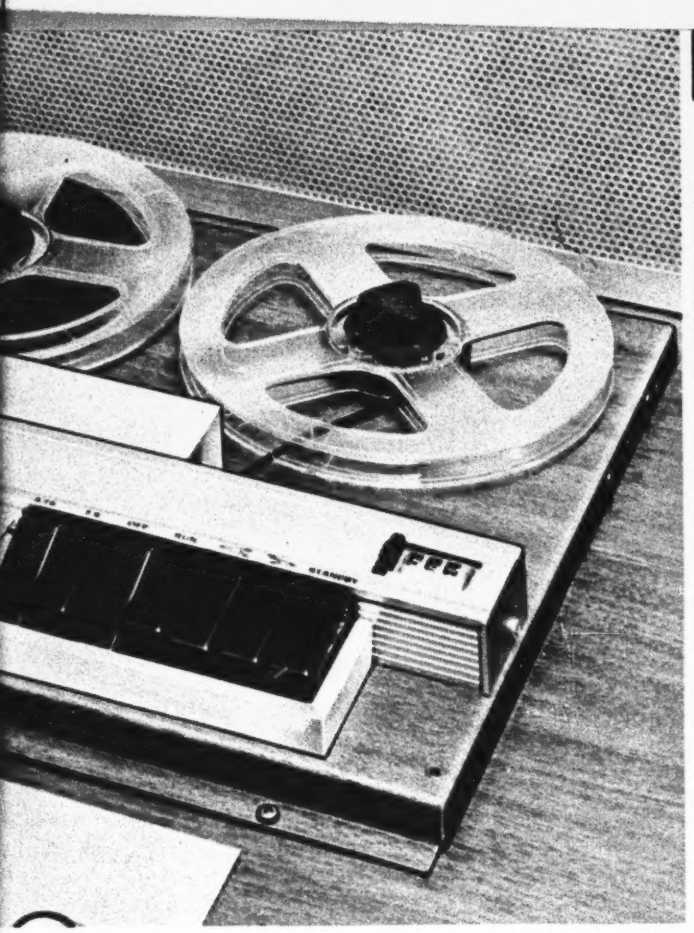
The mode of the learner may be passive reception, active participation, or independent practical expression. Equipment which is designed to serve one or more of these modes will progress in complexity from the simple to the more sophisticated, and in the same order, from the inexpensive to the more costly. Thus the required budget may range from less than $200 for a simple portable classroom recorder to more than $200,000 for a centralized audio-visual and video recording and transmission system.

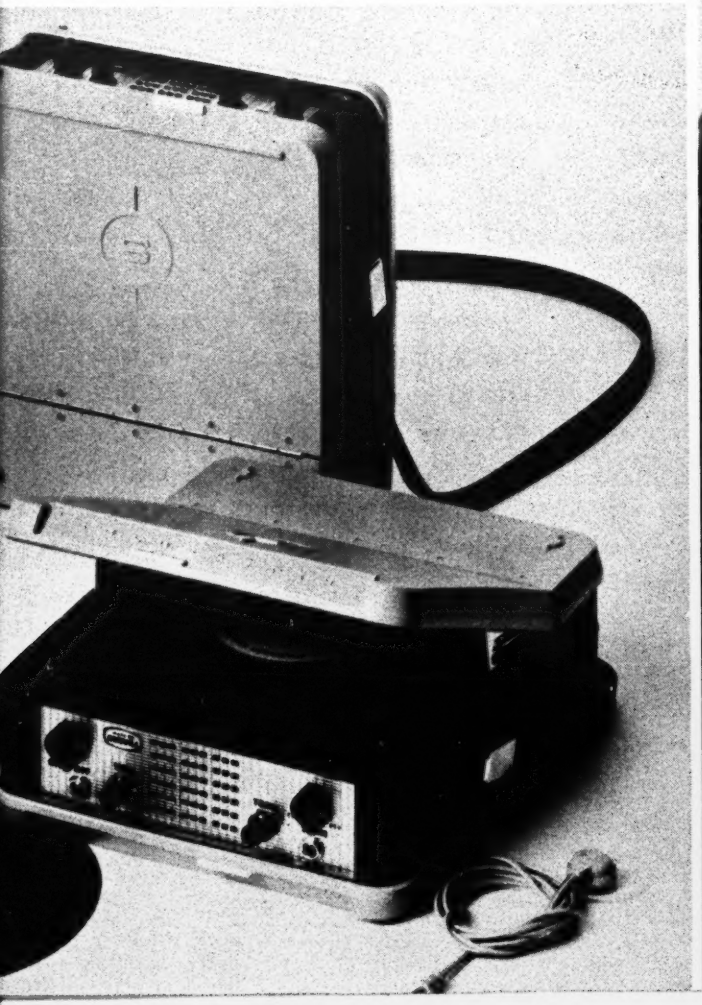
This publication is not intended to be technically precise. Nor is it intended to "out-guess" the bidding habits of competitive contractors. It is designed to help school administrators and staff members visualize the over-all spectrum of electronic teaching systems in gradation of function and cost. The publication seeks to suggest which learning functions can be served, to symbolize the nature and progressive complexity of each electronic system, and finally to estimate budgets that will provide for both adequate systems and engineering and warranty costs.

Students listen as a classroom group. The teacher plays recorded material using a portable classroom record player or tape recorder equipped with an amplified speaker. The teacher can also speak through the system using a microphone.

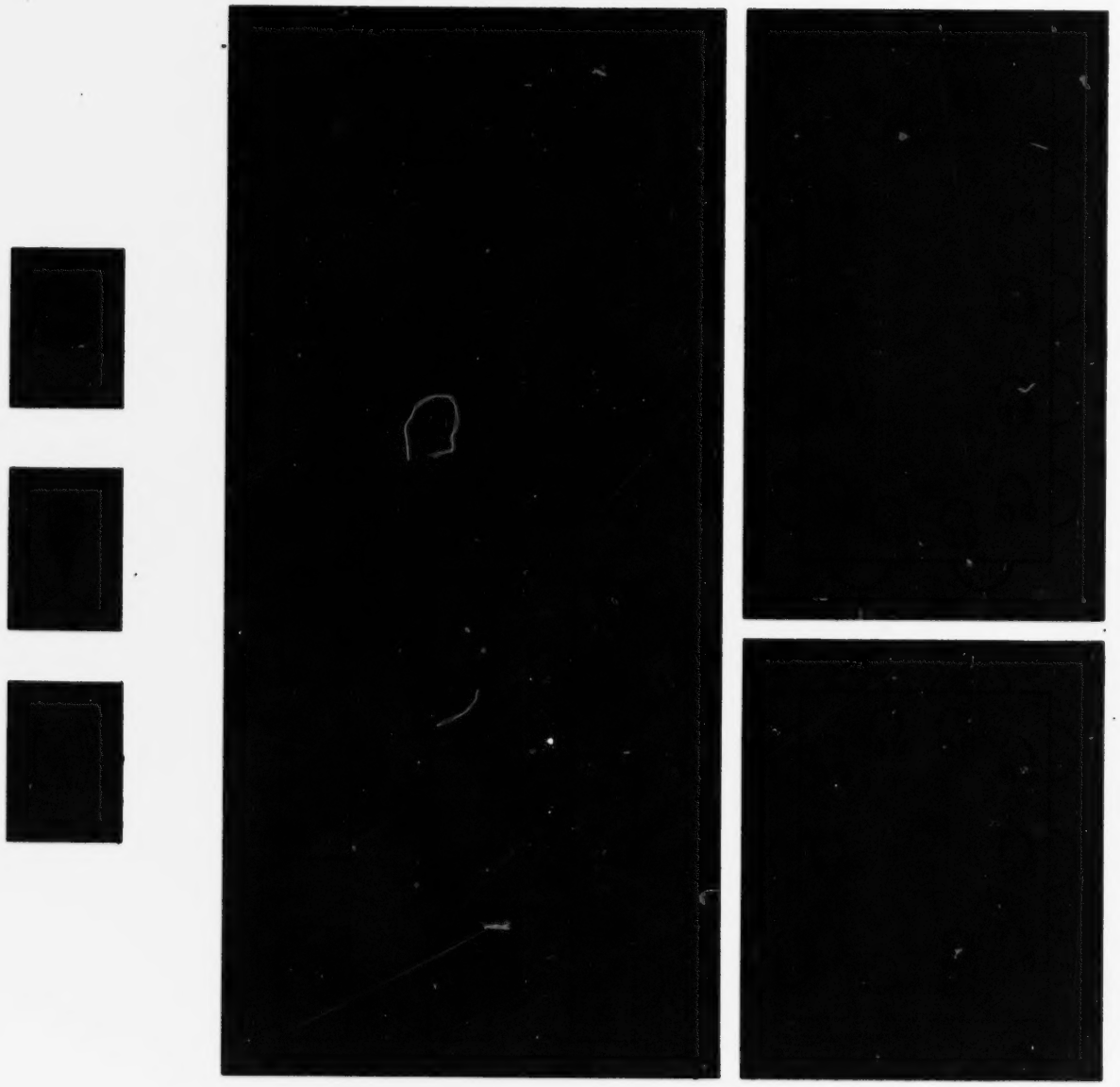


Budget $150 to $300 for a monaural or stereo set.



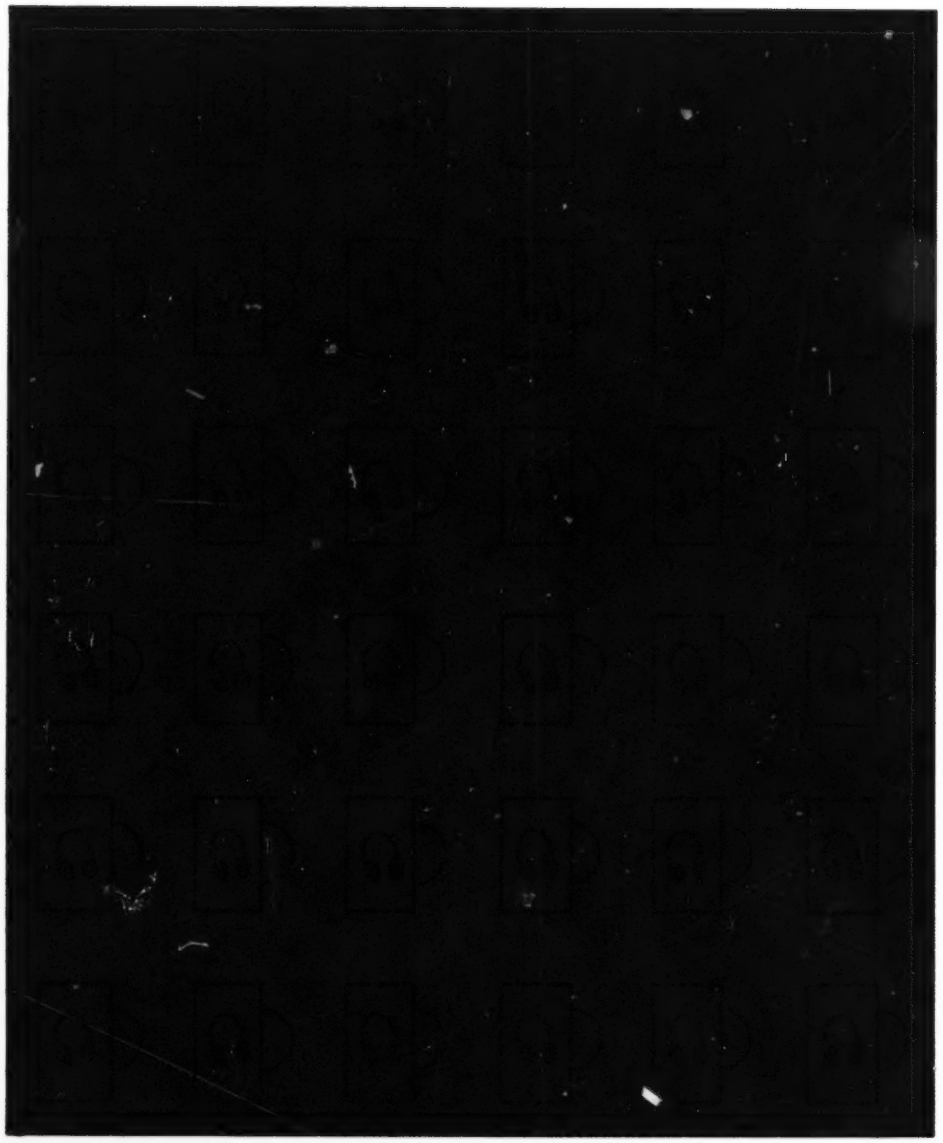


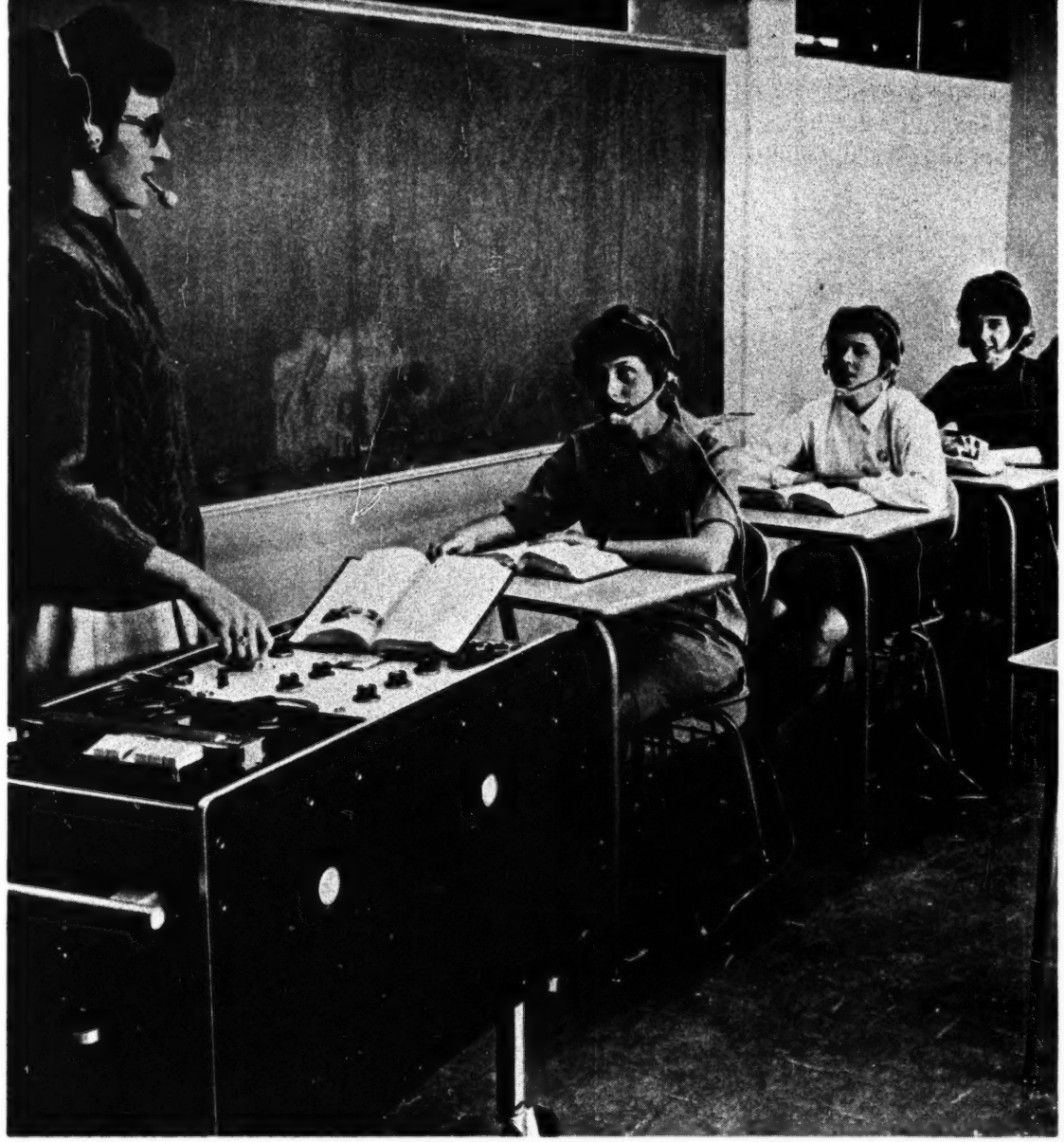
Students listen in small, isolated groups using a record player or tape recorder with jack box and headsets. Small groups can look and listen using a combination sound reproducer and slide or film strip projector with a rear view screen.

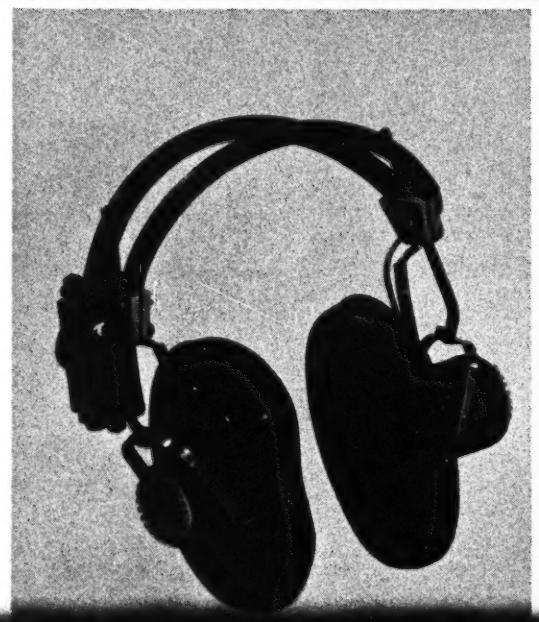


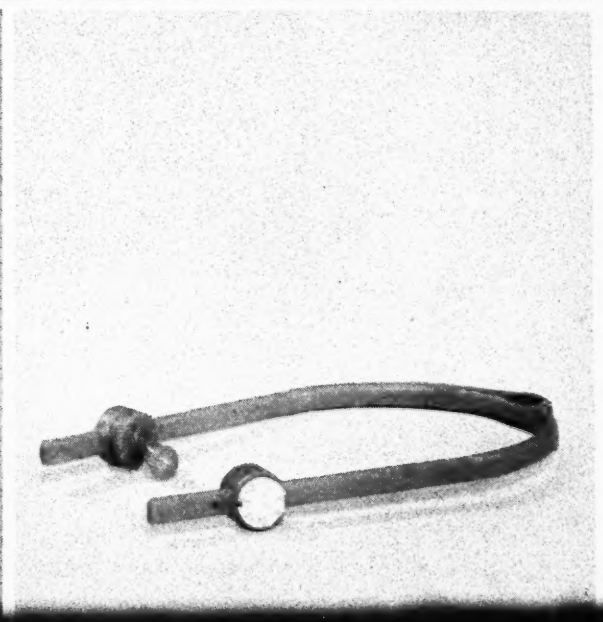
Budget $400 □ A record or tape player at $250 □ 8 dynamic headsets at $150.

Students listen silently as a classroom group using headsets.



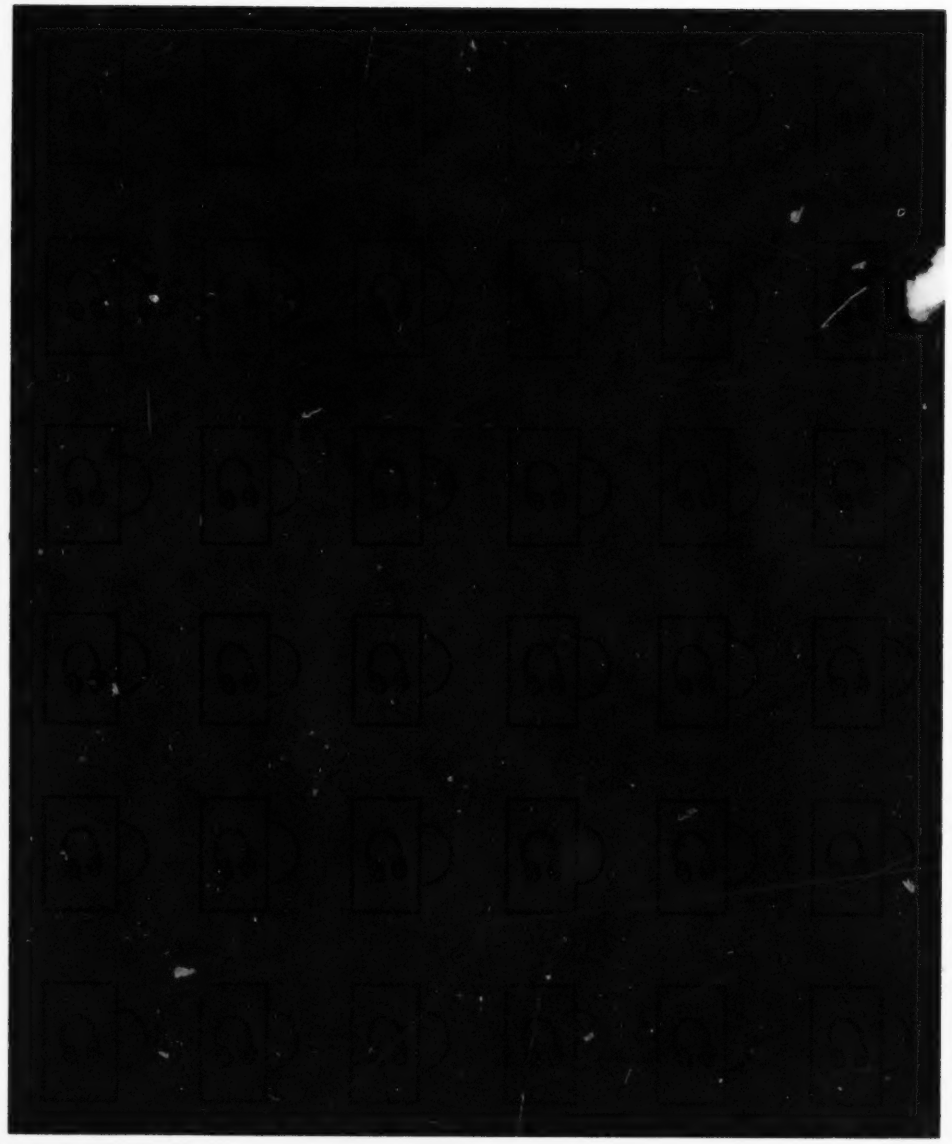


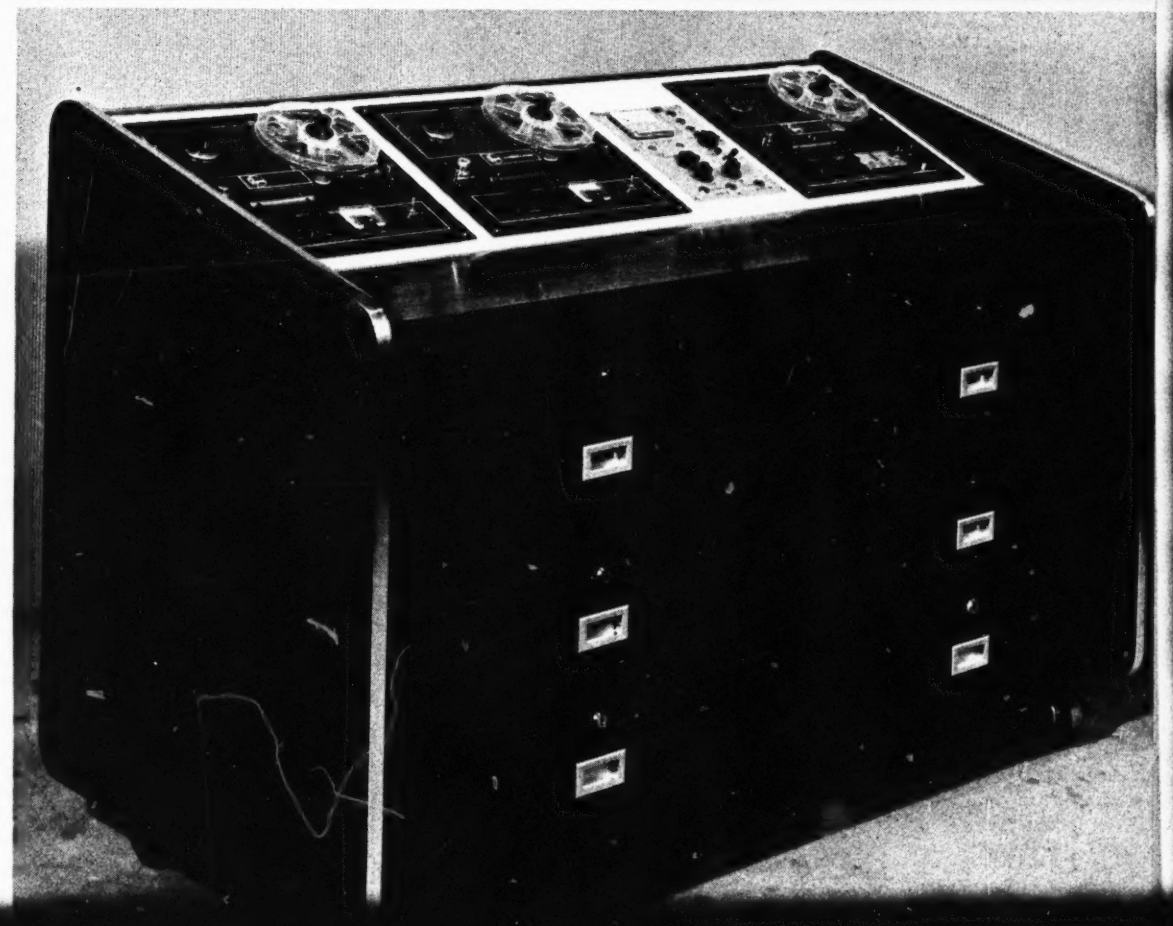




Budget $2,000 for 36 students ☐ A single program source with accessories and interconnections at $400 ☐ Perimeter conduit installed to connect rows of student stations with headset and volume control for each student at $1,600.

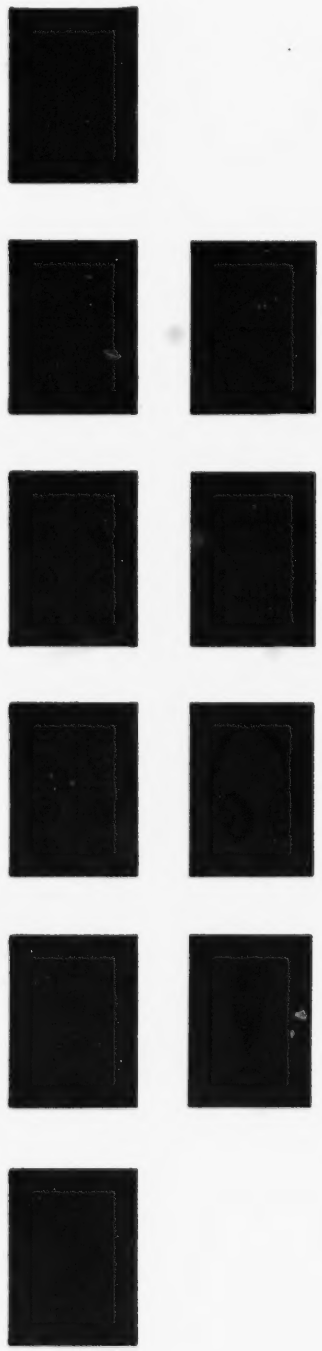
Instructor selects one or more programs for simultaneous transmission to different groups and individuals in a class.





Budget $3,700 for a typical multi-rate dictation laboratory, including ☐ A mobile instructor's console with 4 tape recorders and a (program to student) switch panel at $2,100 ☐ 36 student stations (less furniture) with a headset and volume control for each student at $1,600.

Students listen to radio and recorded materials in library study areas.
Facilities are expanded to accommodate class groups
scheduled by instructors and also students who seek to listen independently.

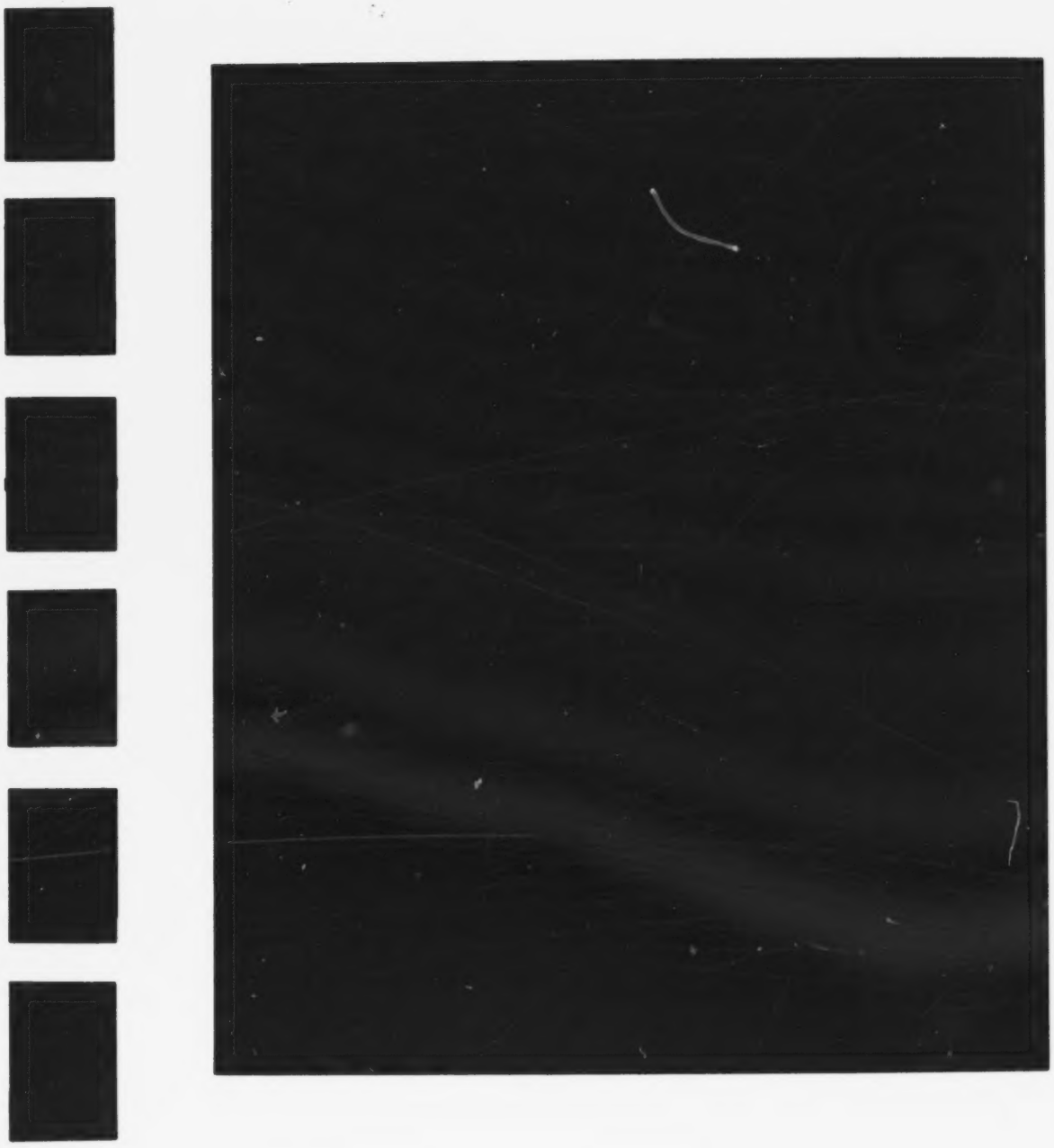


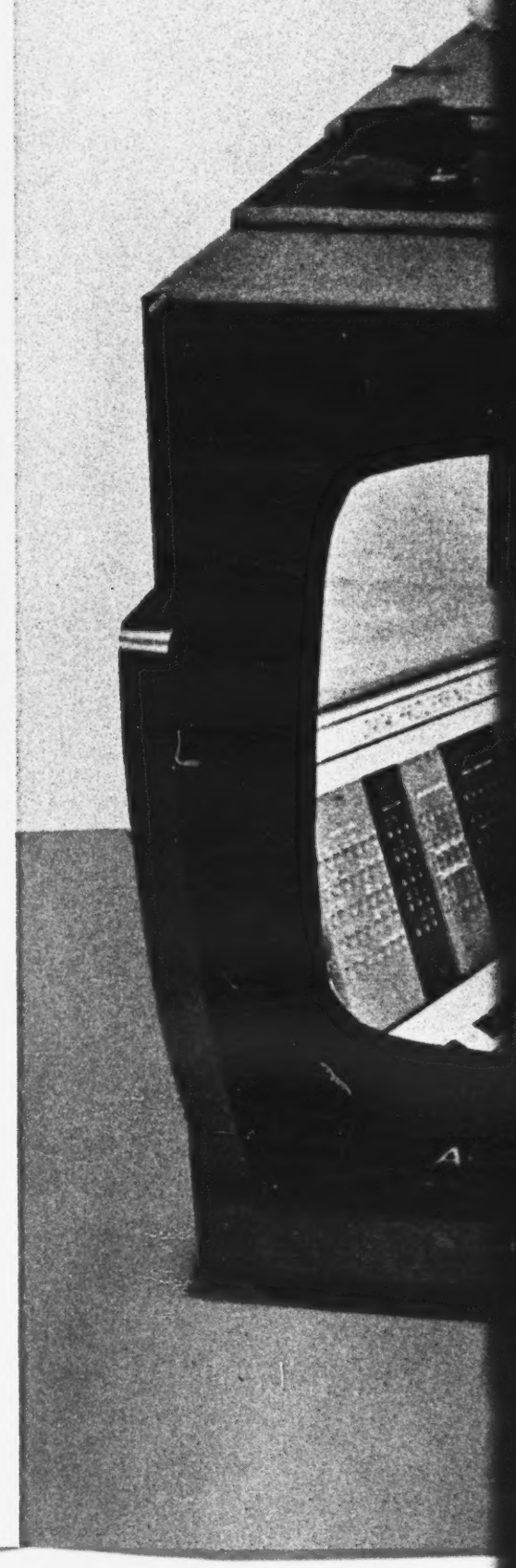
Budget $25,000 for a typical library listening facility,
including □ A program control center with 4 stereo and 16 monaural channels at
$12,500 □ 100 audio carrels with headsets and volume controls at $12,500.

Students listen and respond using headsets and microphones.
Equipment permits students to participate in programmed audio lingual practice and also enables instructor and student evaluation and inter-communication.

Budget $10,000 for a typical audio-active language laboratory, including □ An instructor's control console with 4 program sources and a monitor-intercom-distribution panel at $2,500 □ 36 student carrels, each with headset, amplified microphone and volume control at $7,500.

Students look and listen. Projected
transparencies are programmed and synchronized with tape recorded sound.

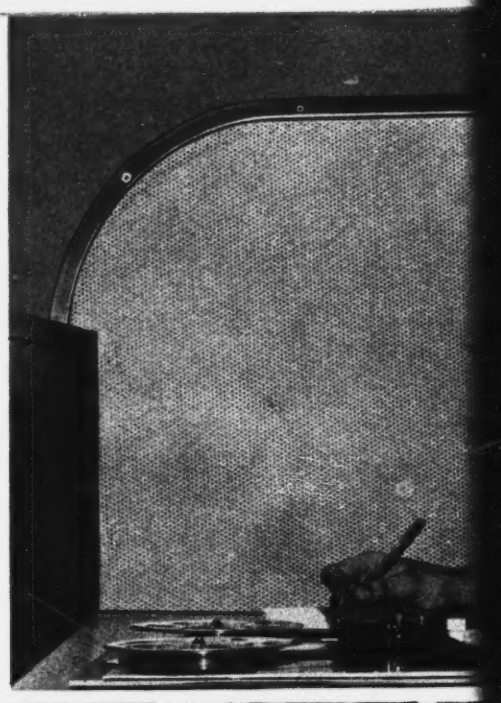


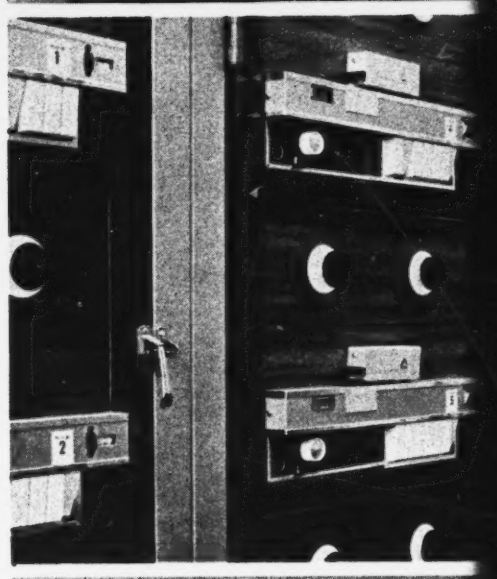


Budget $600 □ A combination sound slide projector with automatic slide changer, remote controls, and "programmer."

AVR-1
OK
NO
DO
START

Students listen, respond, record, and compare. Carrels are equipped with headsets, microphones, and binaural tape recorders. Equipment enables students to engage in repetitive practice and to progress at own pace.



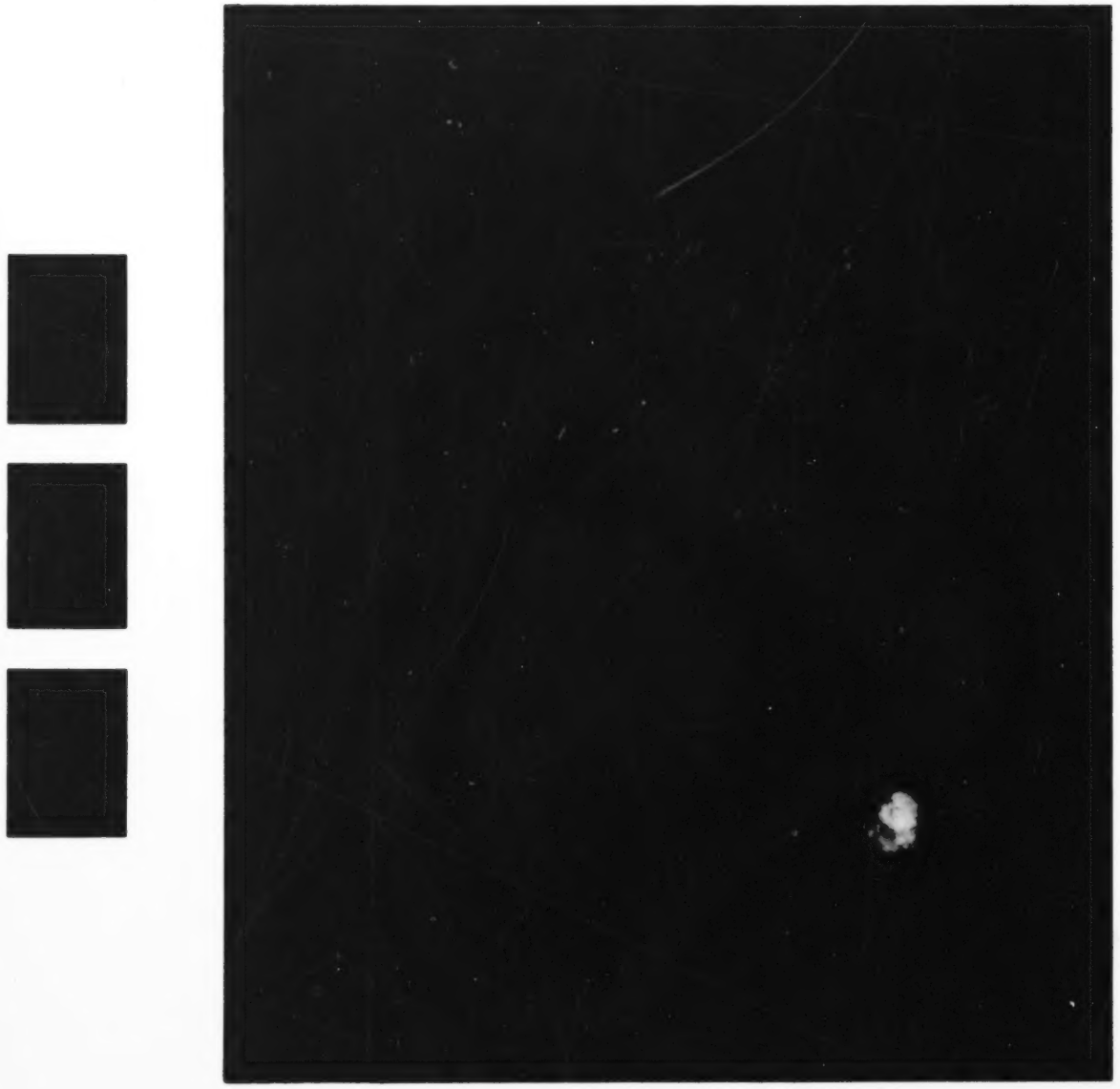


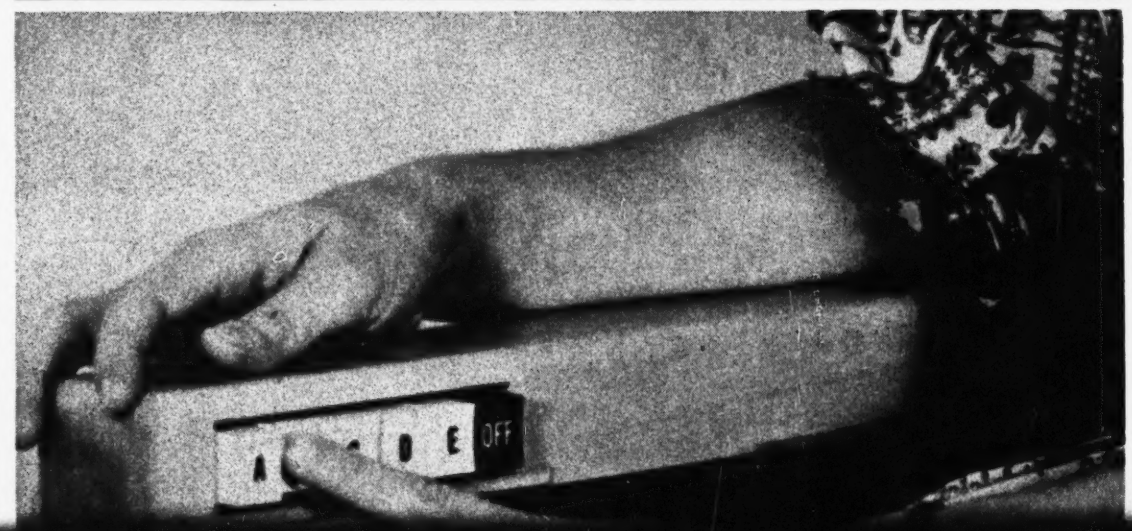
Budget $20,000 for a typical 36-station audio-active, comparative language laboratory including □ An instructor's control console with 4 program sources and a monitor-intercom-distribution panel at $3,000 □ 36 student carrels with headsets, amplified microphones, and tape recorders at $17,000.

Budget $30,000 for a similar language laboratory, in which the student recorders are centralized and "cabinet mounted" for remote control by each student.

AUDIO VISUAL

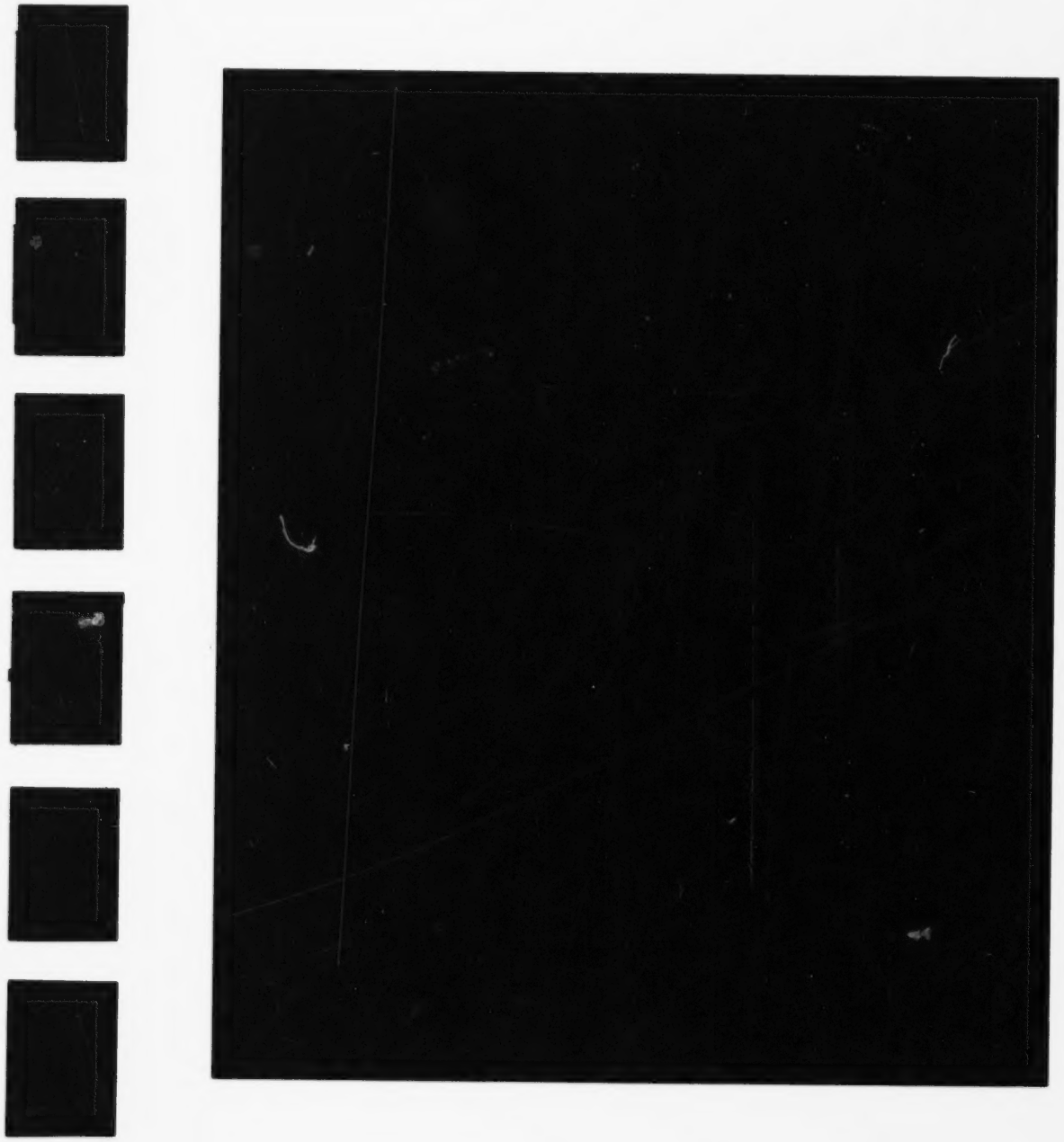
Students look, listen, and respond to testing in the classroom using multiple choice responders. The instructor's console and students' responders enable instant and progressive evaluation of both learning and instruction.

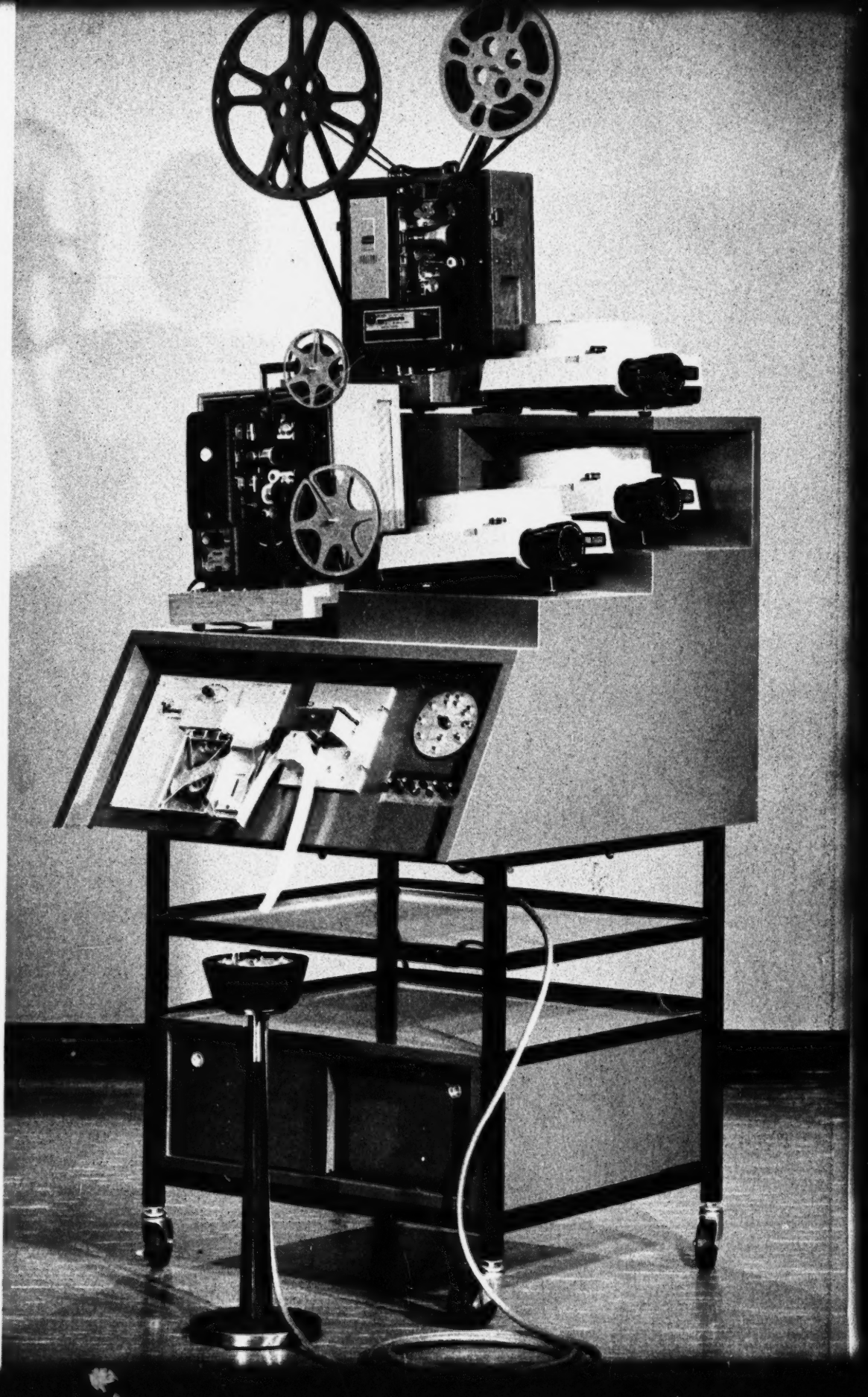




Budget $5,000 for a typical classroom communicator system, including ☐ 36 student multiple choice responders and cabling at $1,500 ☐ An instructor's control console for 36 students with visual percentage scoring meters, and student performance score (digital) counters at $3,500.

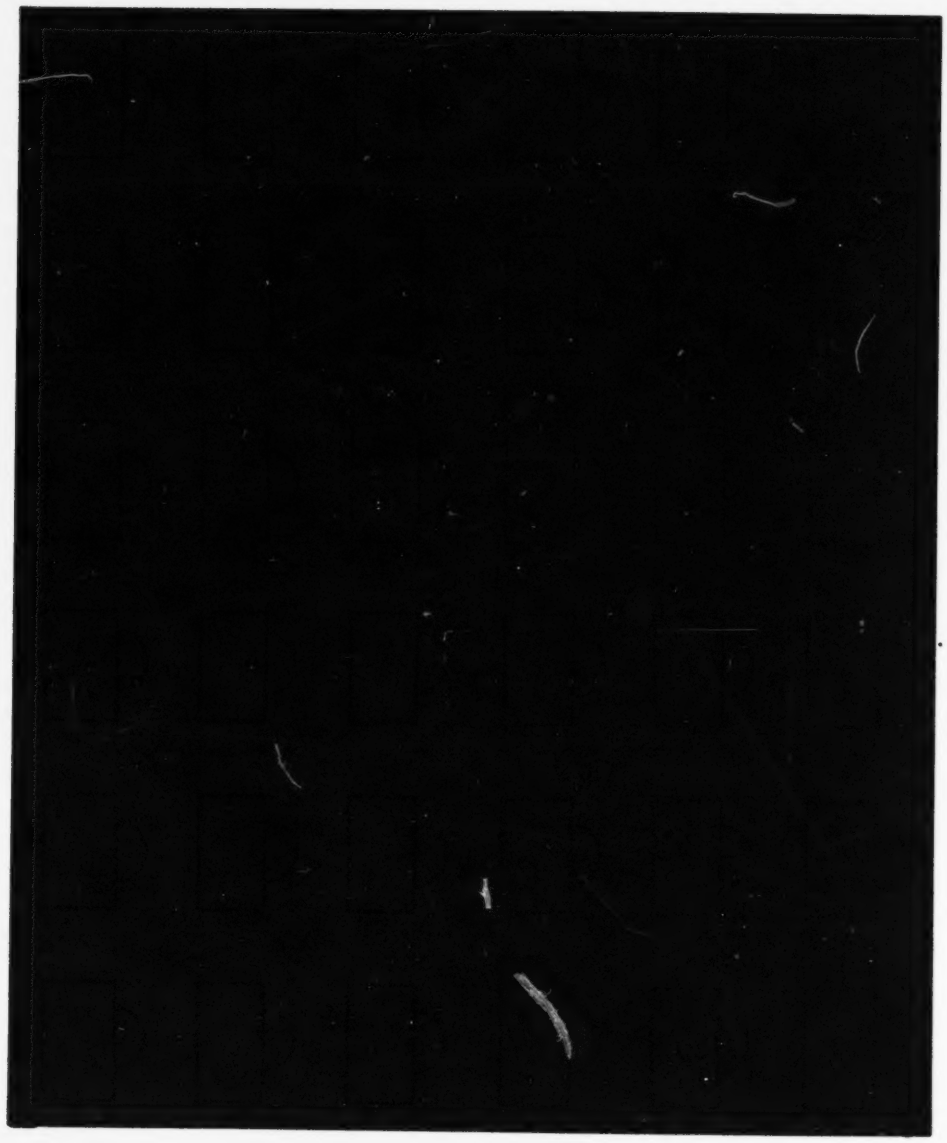
Students look and listen. Audio-visual presentations are selected and remotely controlled by the instructor from multiple slide and motion picture projectors.



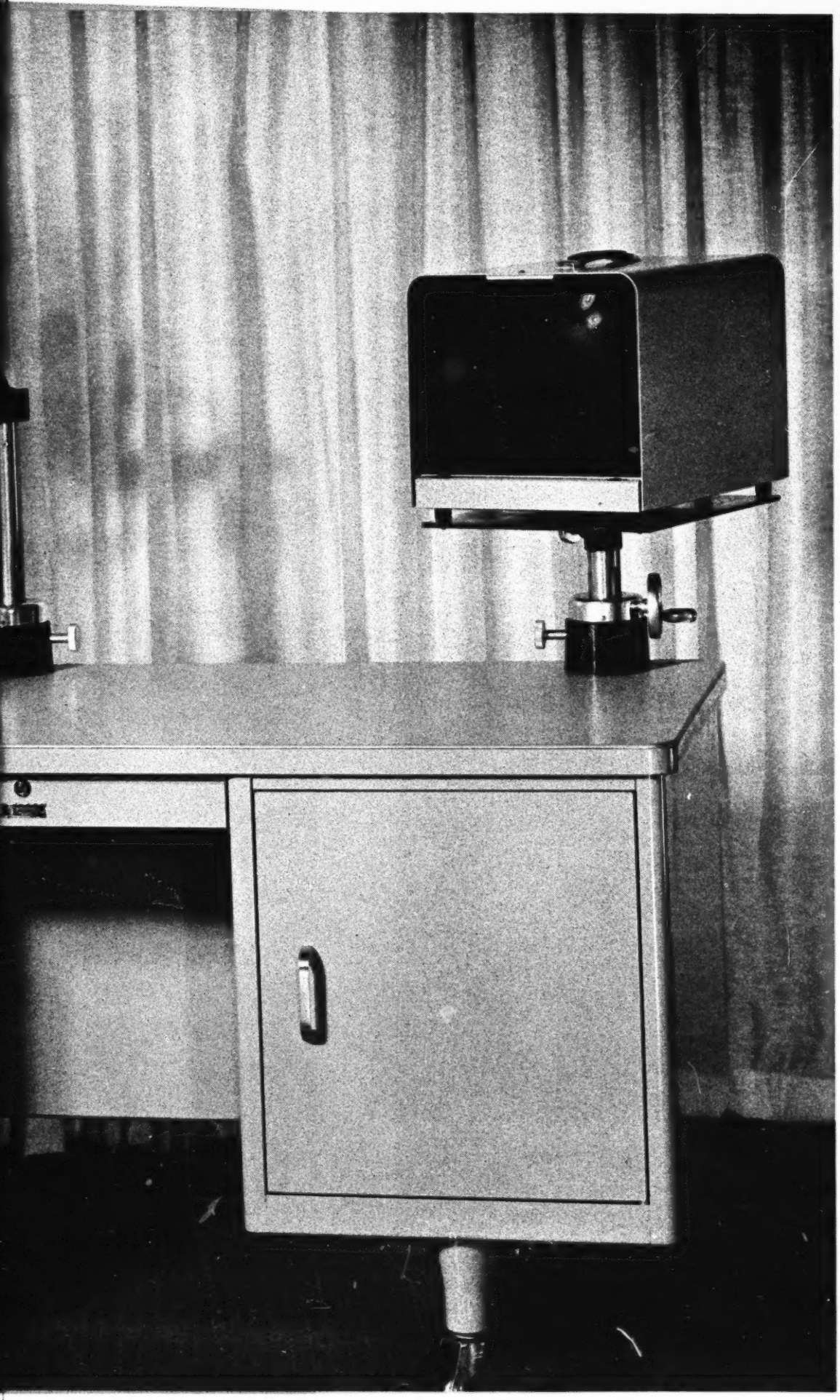


Budget $1,600 ☐ A motion picture projector adapted with remote controls at $750 ☐ 2 slide projectors adapted with remote controls at $500 ☐ A desk top remote control panel and accessories at $350.

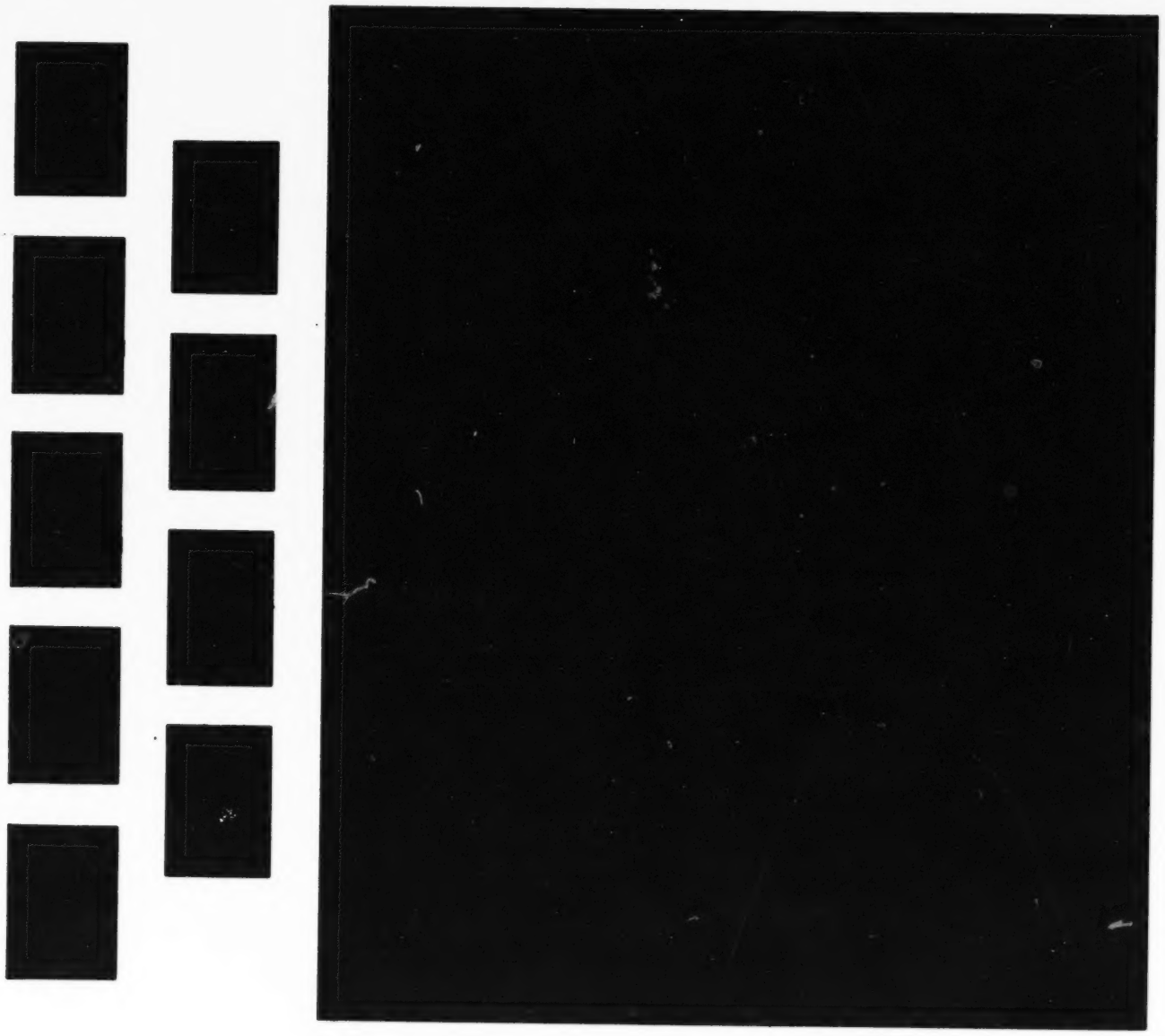
Instructor magnifies living, animated and still teaching material using a vidicon TV camera and a classroom TV receiver.

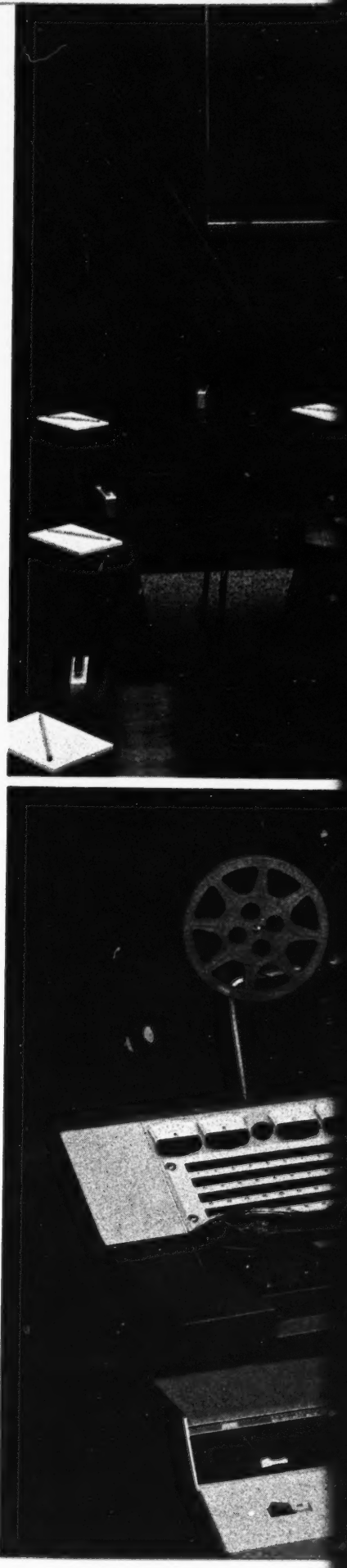


Budget $3,000 □ A vidicon TV camera with zoom lens, tripod and dolly at $2,600 □ A classroom VF/RF receiver with TV stand and accessories at $400.

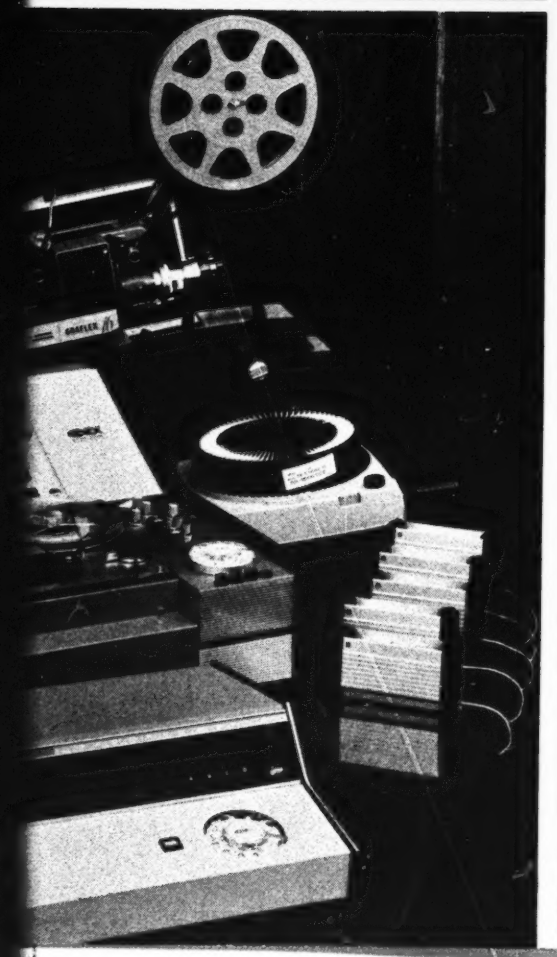


Students look, listen, and respond as a large forum group.
Instructor's program and pace multi-media audio-visual presentations.
The instructor's console and equipment includes a "programmer" with recorder for encoding the control of the audio-visual
selections, and the group's use of the communicator/responder system.
A computer circuit and printer can further
enable the data processing and print out of mass and individual scores.



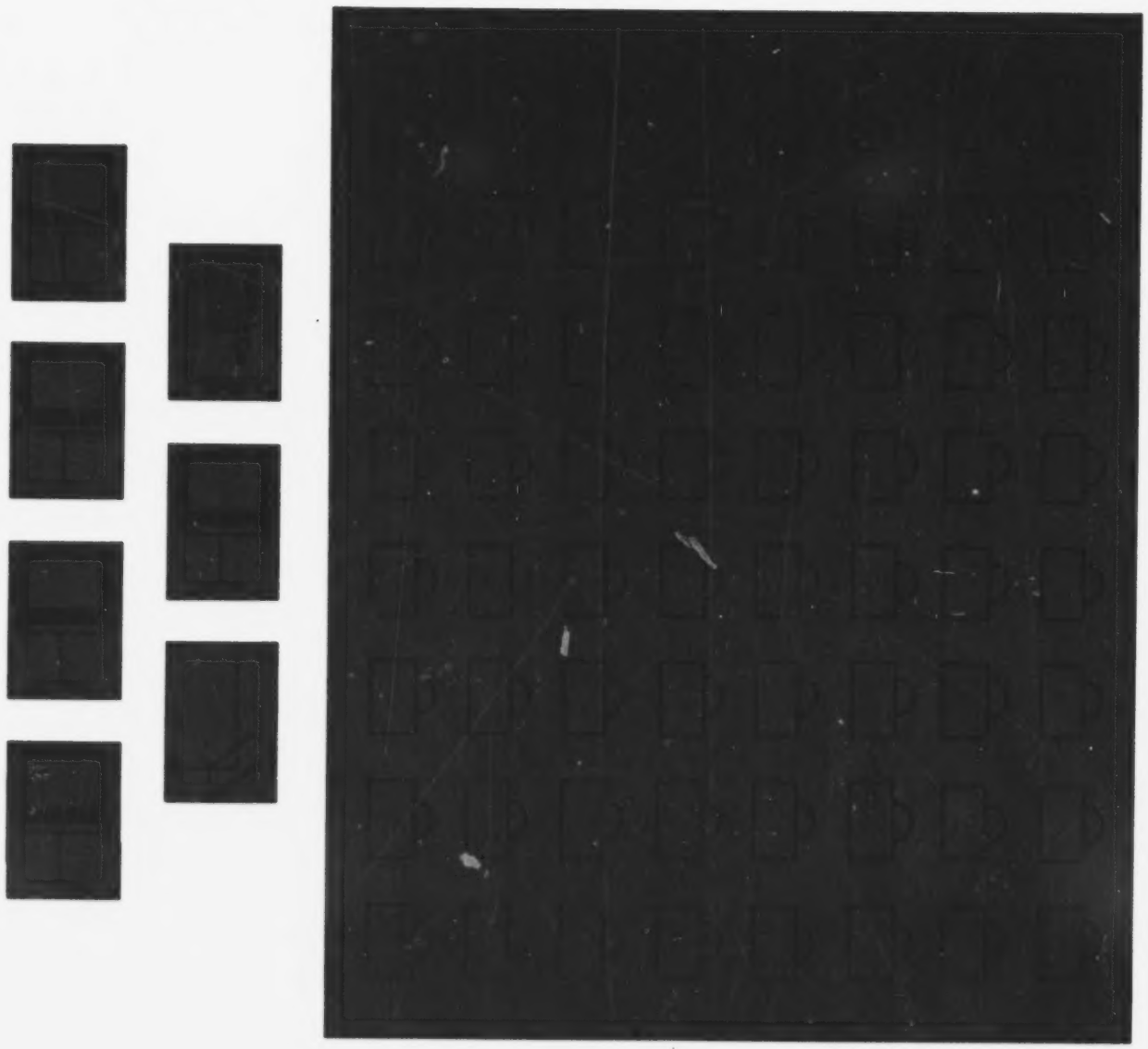


Budget $30,000 for a typical multi-media teaching
system, including ☐ 100 student stations with multiple choice responders ☐ 1 motion picture projector and 2 slide projectors with remote controls
and installed for rear-screen projection ☐ Instructor's programming and
control console, and classroom communicator system for 100 students.



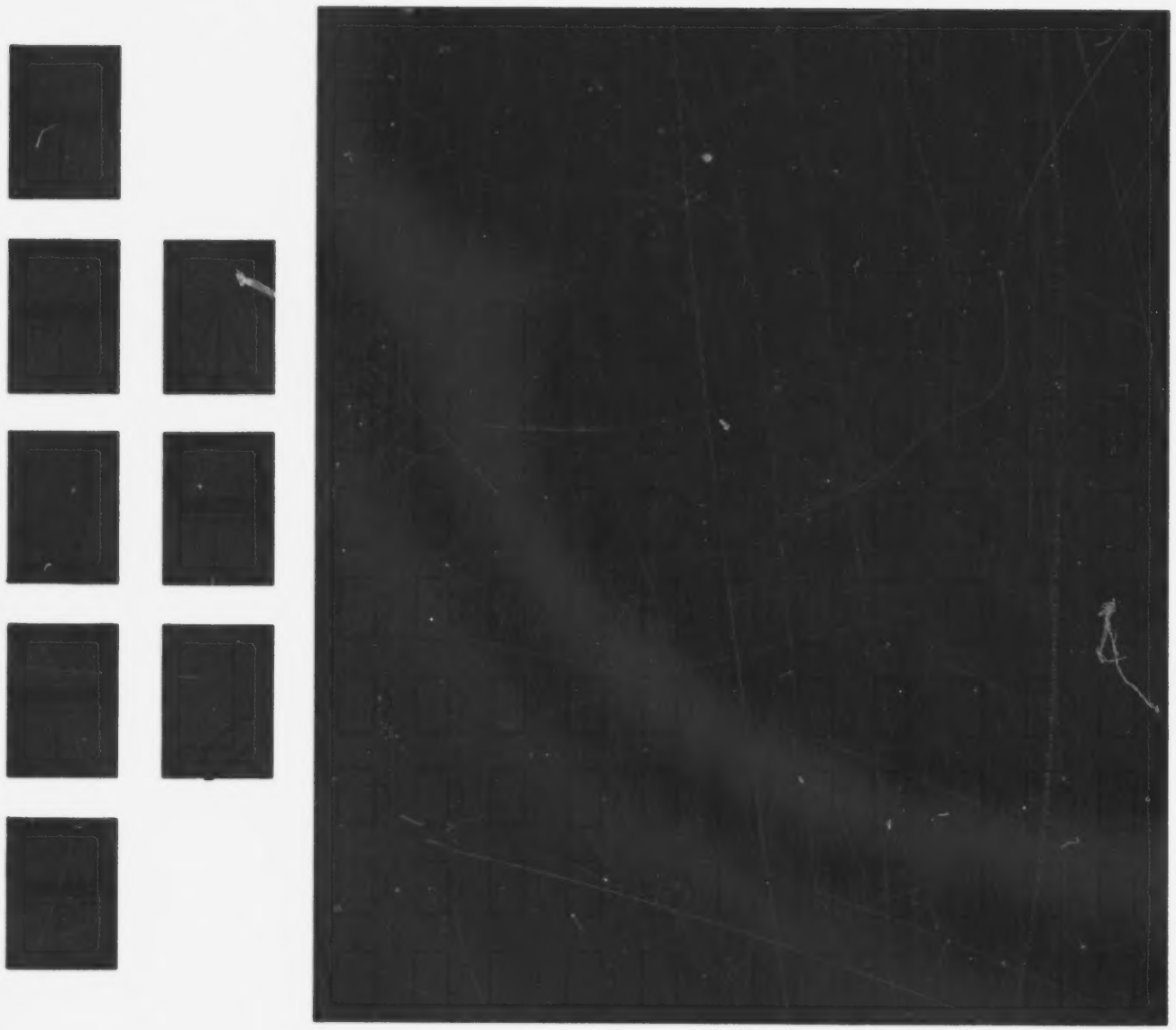
TELEVISION

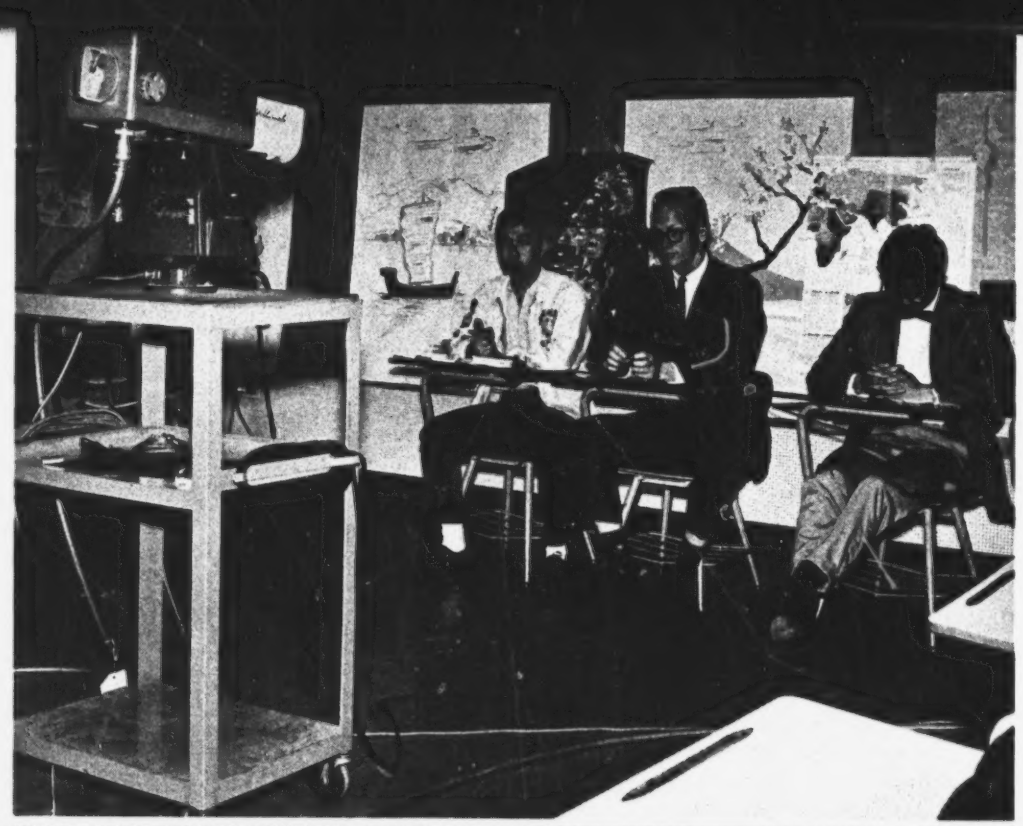
Instructors team teach in large classrooms with an audio-visual TV teaching console and multiple TV receivers.



Budget $5,000 ☐ A mobile instructor's TV console with reflecting optics, rear-view screen, viewing monitor and a TV camera elevator column at $1,300 ☐ A vidicon TV camera with zoom lens at $2,400 ☐ 4 classroom VF/RF TV receivers with stands at $1,300.

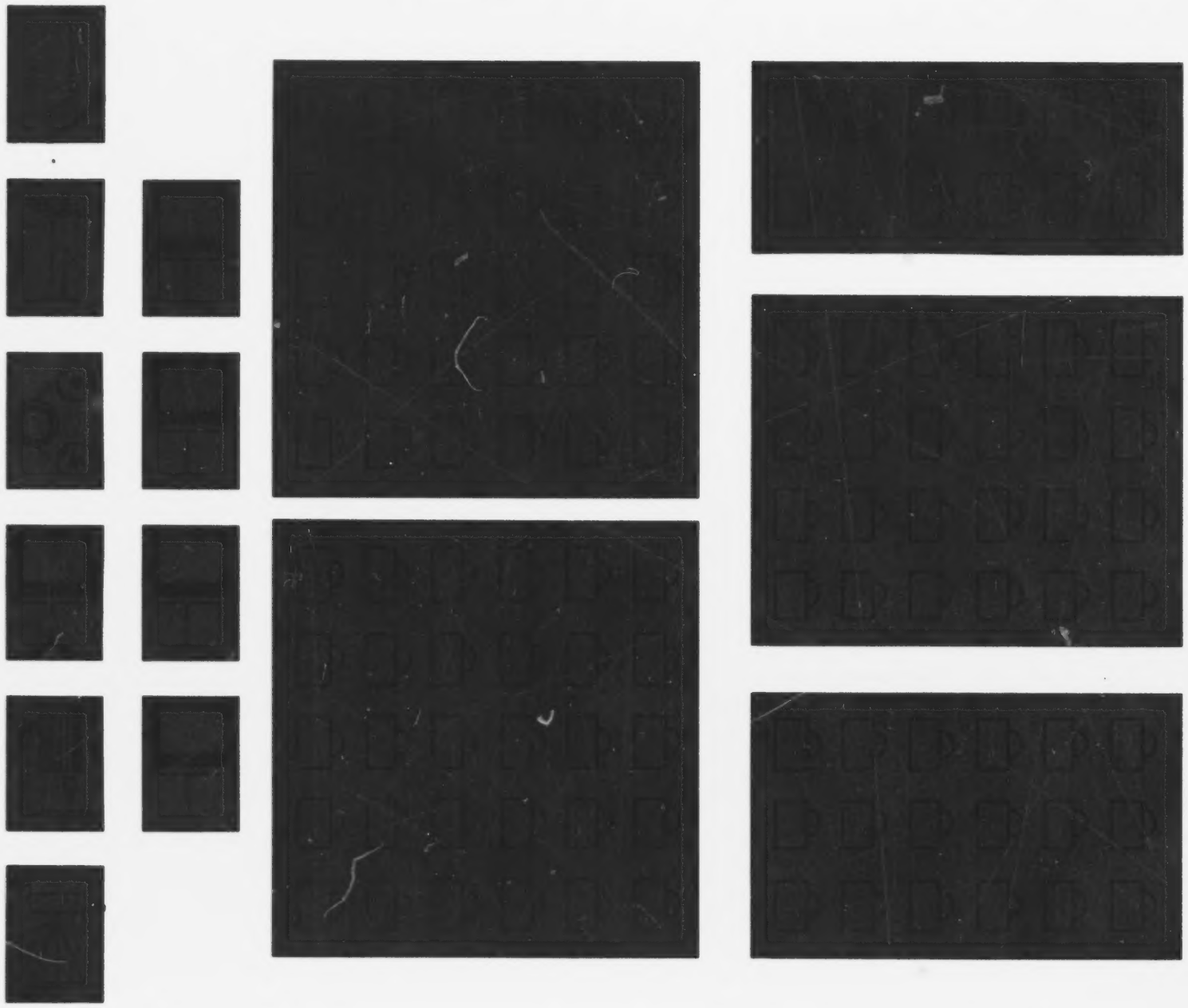
Instructors team teach in large classrooms
using more than one TV camera. This permits greater flexibility and a larger "field" for demonstration activity.

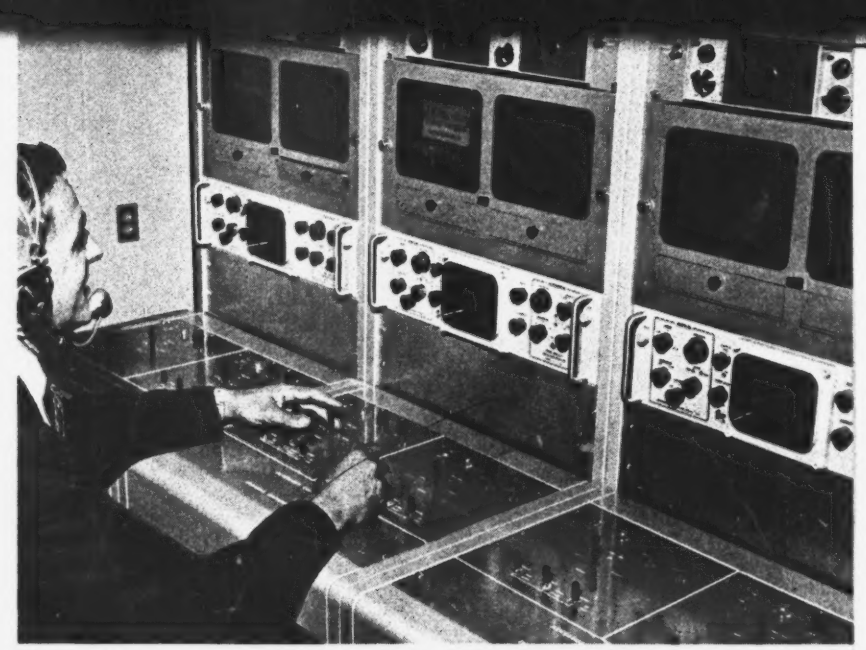


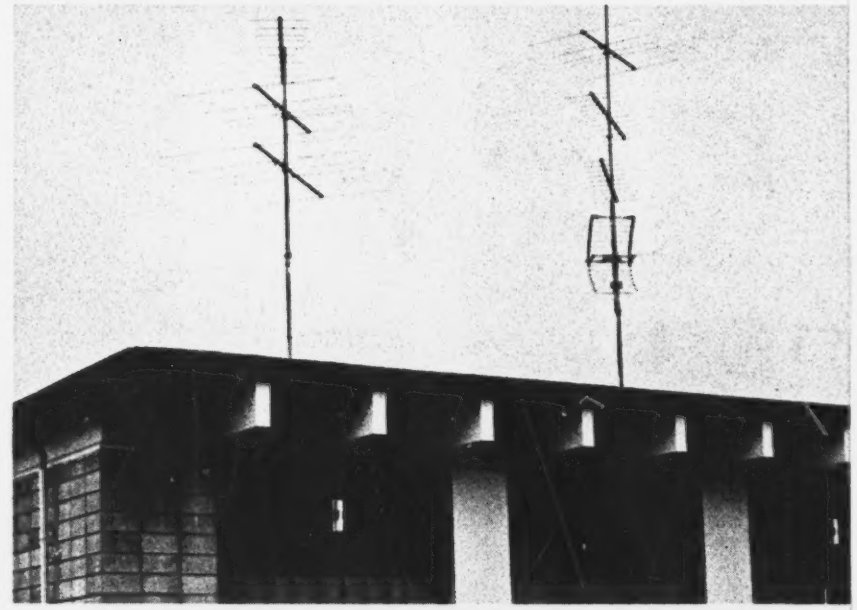


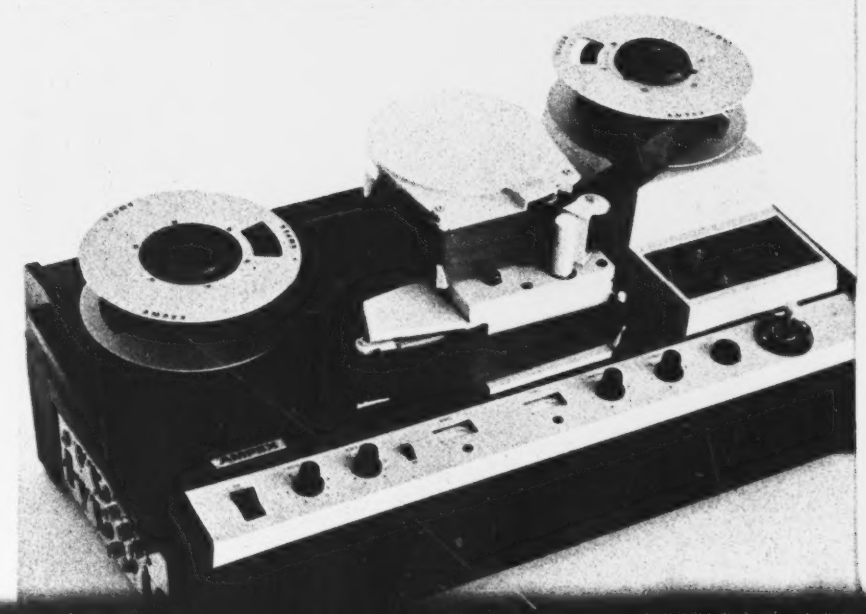
Budget $12,500 □ A mobile AV-TV teacher's console and
4 VF/RF classroom receivers at $5,000 □ A viewfinder TV camera chain with assorted
lenses, remote camera controls, simple camera
switcher and an audio-video RF modulator at $7,500.

Instructional resource centers transmit selected "off air" TV broadcasts, and recorded video programs to teaching and learning areas.



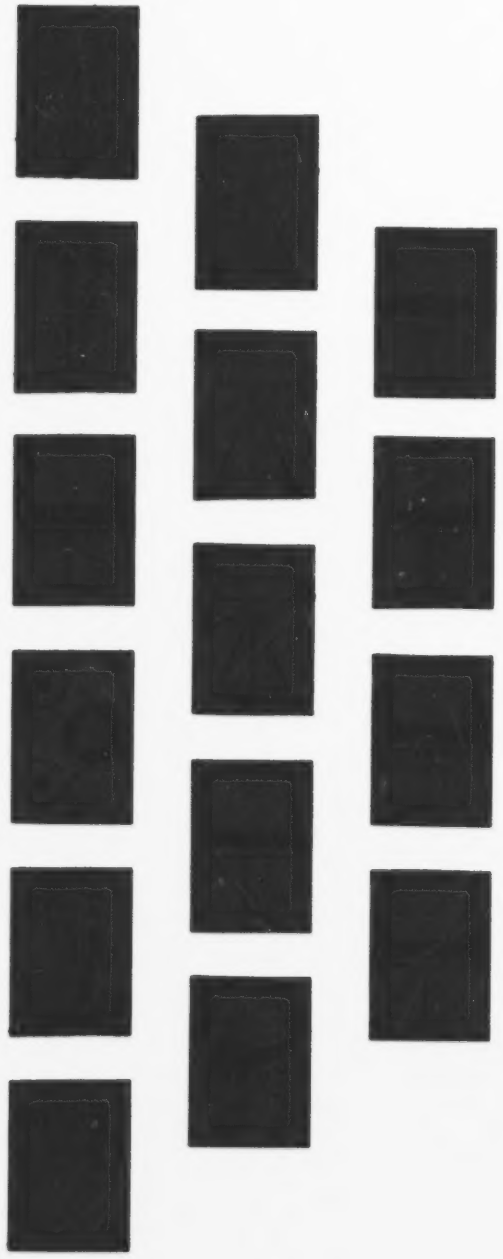




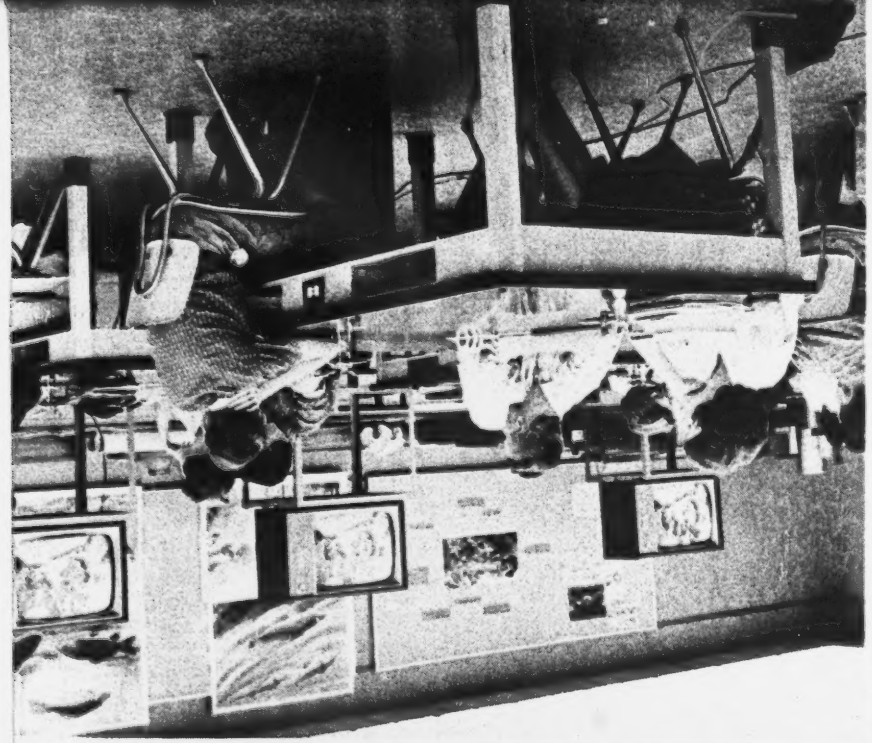


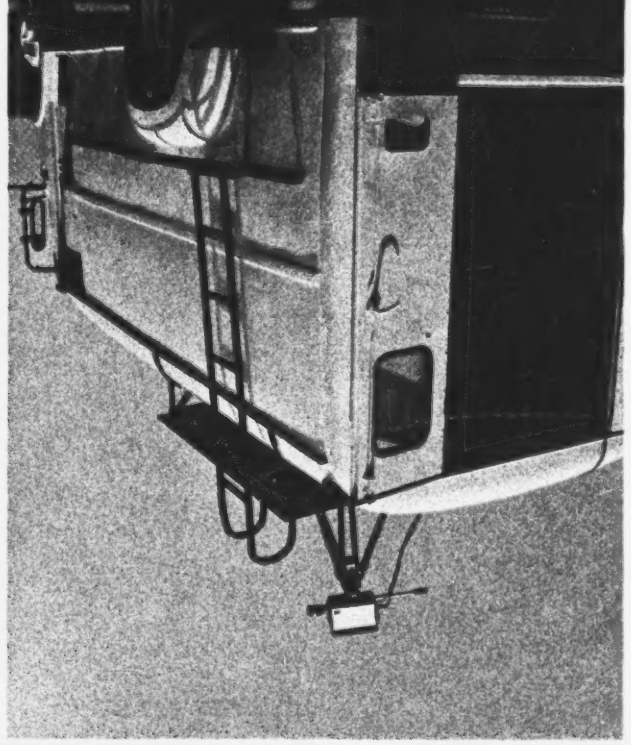
Budget $65,000 for a typical closed circuit television system (less studio), including □ A mobile AV/TV console with 2 cameras for remote classroom use at $12,500 □ A master antennae system, central distribution panel and 50 VF/RF classroom receivers at $17,500 □ Engineering, labor and one-year warranty at $10,000 □ 2 "broadcast compatible" video tape recorders at $25,000.

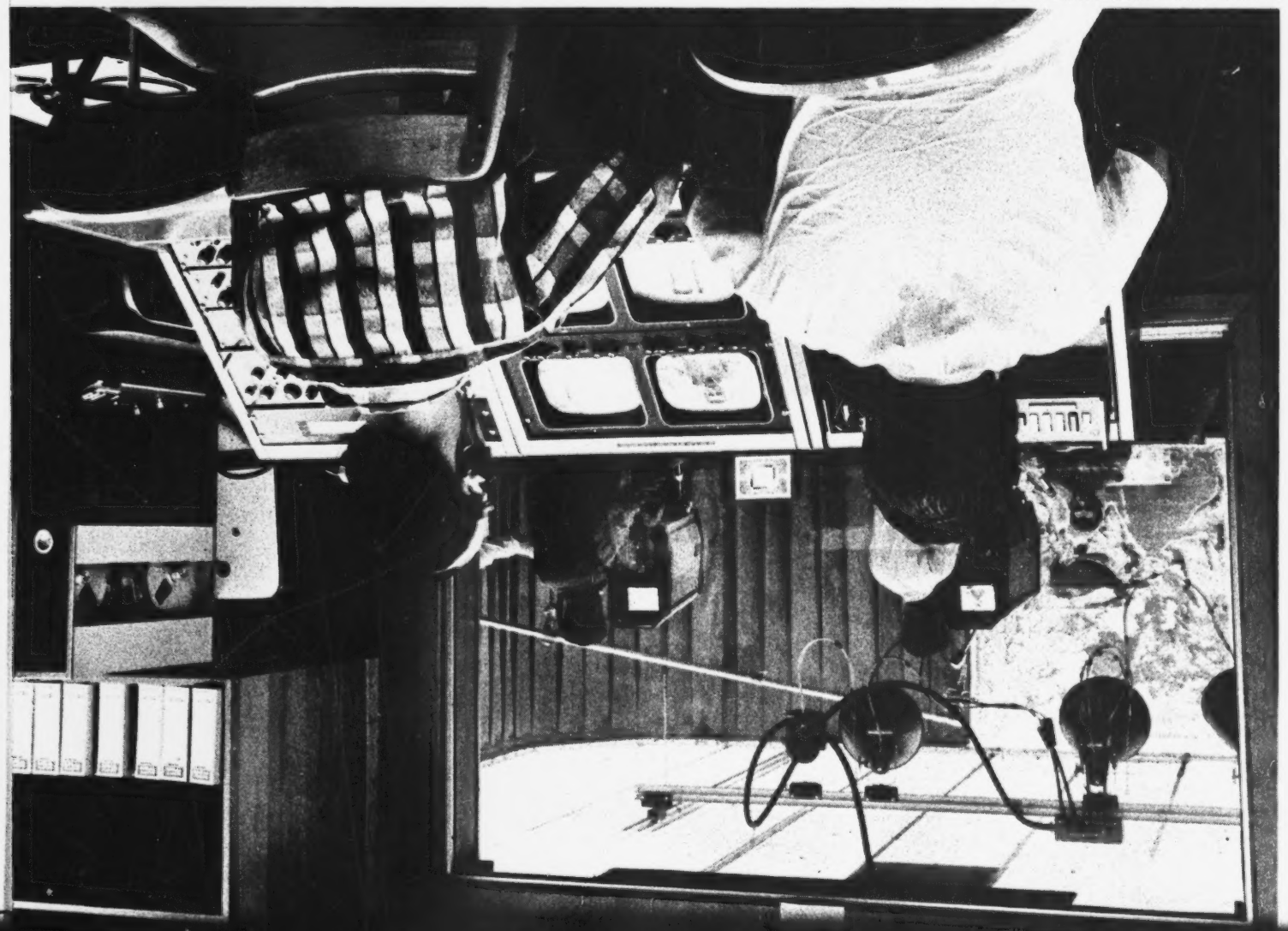
Teachers and students participate in the "live" production and recording of TV teaching programs with centralized TV studio facilities.



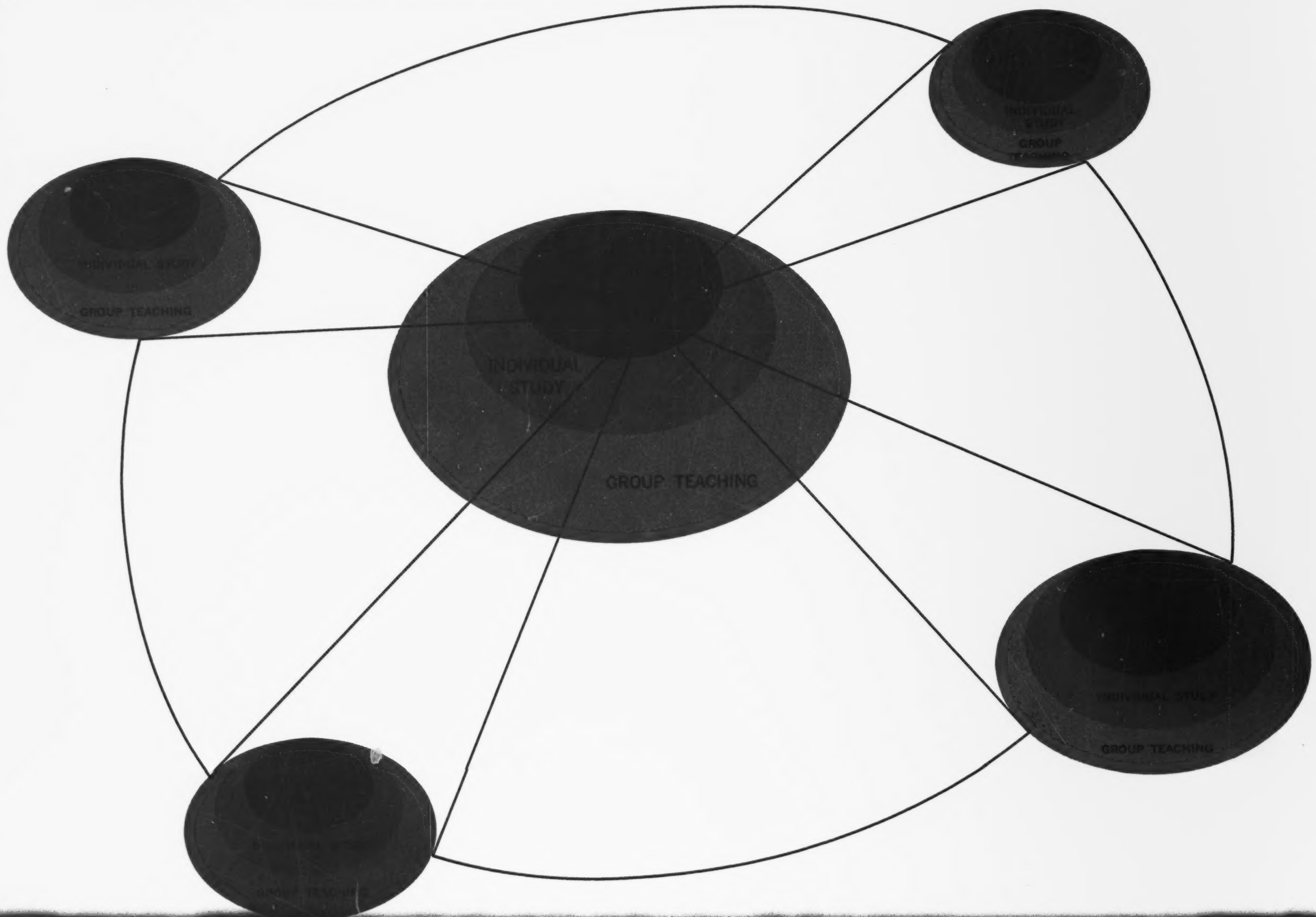
Budget $65,000 for a typical closed circuit TV system (preceding page) plus $45,000 to provide □ Studio lighting fixtures, a 3-viewfinder camera chain with associated camera control console, 2 studio self-contained remote cameras, engineering, labor, and one-year warranty.







Potential School or School District Electronic Teaching Aids Network



IN SUMMARY

The preceding pages of SPECTRUM have presented a number of audio-visual system configurations for extending instruction to more students in less time. The presentation has taken into account small, medium, and large student groups and has also described emerging systems which can be adapted to various modes of student participation. The electronic means for distributing instructional resources throughout a school plant have been illustrated in an order from the simple to the more complex and have been accompanied by an approximation of the costs. It is hoped that SPECTRUM will be a convenient and useful reference to those entering the preliminary stages of planning for electronic teaching systems.

A Word of Caution

SPECTRUM does not obviate the need for the careful development of a utilization plan prior to the purchase of electronic systems. Such systems do have a great potential and they are needed. The need for them is acknowledged in the National Education Bill of 1965, which expands federal aid for audio-visual items to include items for all the educational disciplines. But electronic teaching systems are means only, and their potential can only be realized through programmed application.

A few points of admonition to potential buyers of electronic teaching systems are especially pertinent in this context:

1. Specify educational requirements. Determine specifically what you want the equipment to do for you. Take advantage of the constructive suggestions of people who will use the system. Sustain the "teaching tool" perspective with a continuing program of user participation in system development and utilization.

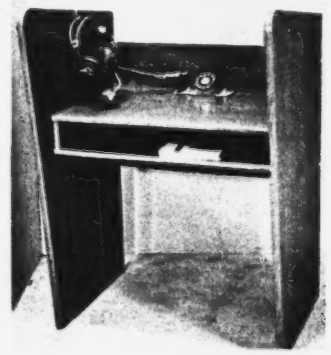
2. Use qualified consultants. Manufacturers' representatives can be very helpful in correlating equipment characteristics with educational requirements. However, specifications for complex systems should be evaluated and prepared in final form by a communications system expert. His knowledge is inexpensive considering the major mistakes that can be avoided.

3. Avoid false economy. Substandard or noncompatible equipment is expensive at any price. Systems that are over-qualified and elaborated to exceed specifications may represent an unnecessary expense. Use your expert to evaluate and approve contractor's deviations and substitutions.

New Directions

Two interesting and related aspects not treated in SPECTRUM will be excellent subjects for separate treatment. One is new directions in student use of programmed instruction with individual teaching machines and, a second, the application of electronics systems to data processing and retrieval in the over-all educative process, including counseling and administration. We hear teachers say, "I love to teach, but have so little time for it." The teacher needs to conserve time for teaching by recovering the time required for mechanical operations and also the time lost in clerical detail. So it now makes sense to centralize the technical and mechanical operations for qualified attendants to handle, and further to add electronic facilities for processing the multitudinous details associated with testing, counseling, and administration.

The illustration on the opposite page is symbolic of what is beginning and what will surely happen. The nerve center, or better the communications intelligence center, is located within the area of the instructional resources facility. Programs are recorded and transmitted to the student study stations and to the teaching areas. Two-way transmission is provided to accommodate remote recording and intercommunication. Rapid interchange of programs among the several schools of a district is achieved by electronic transmission links.



OTHER REPORTS FROM EFL

BRICKS AND MORTARBOARDS A guide for the decision makers in higher education: how the colleges and universities can provide enough space for the burgeoning enrollments of this decade; how that space can be made adaptable to the inevitable changes in the educational process in the decades ahead. (One copy available without charge. Additional copies $1.00.)

COLLEGE STUDENTS LIVE HERE A report on the what, why, and how of college housing; reviews the factors involved in planning, building, and financing student residences.

THE COST OF A SCHOOLHOUSE A review of the factors contributing to the cost and effectiveness of school-housing including planning, building, and financing.

DESIGN FOR ETV — PLANNING FOR SCHOOLS WITH TELEVISION A report on facilities, present and future, needed to accommodate instructional television and other new educational programs. Prepared for EFL by Dave Chapman, Inc., Industrial Design.

RELOCATABLE SCHOOL FACILITIES A survey of portable, demountable, mobile, and divisible schoolhousing in use in the United States and a plan for the future.

SCHOOL SCHEDULING BY COMPUTER/THE STORY OF GASP A report of the computer program developed by MIT to help colleges and high schools construct their complex master schedules.

SCSD: AN INTERIM REPORT A first report on the School Construction Systems Development Project — the first project in the U. S. to coordinate the design and use of a series of integrated components to build better schools more economically.

THE SCHOOL LIBRARY A report on facilities for independent study, with standards for the size of collections, seating capacity, and the nature of materials to be incorporated.

TO BUILD OR NOT TO BUILD A study of the utilization of instructional space in small liberal arts colleges, with a do-it-yourself workbook for the individual use of the institutions that wish to survey their own utilization levels.

A STUDY ON STUDYING A report from the Community College Planning Center on Student Study Facilities.

profiles of significant schools

A series of reports which provide information on some of the latest developments in school planning and design.

Belaire Elementary School, San Angelo, Texas
Heathcote Elementary School, Scarsdale, New York
Two Middle Schools, Saginaw Township, Michigan
Holland High School, Holland, Michigan
Schools for Team Teaching — ten examples
High Schools 1962 — educational change and architectural consequence
Schools Without Walls — open plan school design and function
Middle Schools — new designs for intermediate grades

case studies of educational facilities

A series of reports which provide information on specific solutions to problems in school planning, design, and construction.

1. **CONVENTIONAL GYMNASIUM VS. GEODESIC FIELD HOUSE** A comparison of cost, space, and advantages based on a case study of West Bethesda High School, Montgomery County, Maryland.

3. **LABORATORIES AND CLASSROOMS FOR HIGH SCHOOL PHYSICS** Chapter reprinted from *Modern Physics Buildings: Design and Function.*

4. **A DIVISIBLE AUDITORIUM/BOULDER CITY, NEVADA** Case study of an auditorium that can be converted to instructional spaces by the use of soundproof, operable walls.

5. **NEW CAMPUSES FOR OLD: A CASE STUDY OF FOUR COLLEGES THAT MOVED** What the decision to move means from an economic, academic, social, and physical point of view.

6. **A COLLEGE HEALTH CENTER** Case study of a model center for small private colleges; architectural design by Caudill, Rowlett & Scott.

7. **NEW BUILDINGS ON CAMPUS: SIX DESIGNS FOR A COLLEGE COMMUNICATIONS CENTER** Graphic representations of the results of an architectural competition for a new space to house the accoutrements of instructional aids and media.

8. **THE SCHOOLS AND URBAN RENEWAL** A case study of the Wooster Square renewal project in New Haven, Connecticut.

9. **AIR STRUCTURES FOR SCHOOL SPORTS** A study of air-supported shelters as housing for playfields, swimming pools, and other physical education activities.

10. **THE NEW CAMPUS IN BRITAIN: IDEAS OF CONSEQUENCE FOR THE UNITED STATES** Recent British experience in university planning and its implications for American educators, architects, and planners.

technical reports

1. **ACOUSTICAL ENVIRONMENT OF SCHOOL BUILDINGS** by John Lyon Reid and Dariel Fitzroy — Acoustics of academic space in schools. An analysis of the statistical data gathered from measurement and study.